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Original Contributions.

HOW TO FILL TEETH WITH GOLD.

BY J. V. CONZETT, D.D.S., DUBUQUE, IOWA.

(Continued from page 1215.)

Cavities in the approximal surfaces of incisors almost invariably begin immediately above the contact point in the upper teeth and below the contact point in the lower teeth. We sometimes hear of dentists advising their patients to let such small points of decay go for a while, telling them that they are not large enough to fill. I have no patience with any such philosophy, for if caries is present the sooner it is stopped the better. For a cavity that seems to be but a pinhead spot externally will when opened up prove to be a very large cavity, the microorganisms of decay going forward toward the pulp chamber, and backing up under the enamel until the interior of the tooth is almost entirely carious before the overhanging enamel walls break down. It is such cases that cause the patients to come to us with the assertion that the tooth went to pieces all of a sudden, and that it had only been decaying a week or so. If the carious spot is there and has penetrated the enamel, cut out the decay, prepare your cavity and fill the tooth.

In this class of cases, after separation has been obtained and the rubber dam adjusted, break into the cavity with a Wedelstaedt chisel or a small Black hoe. Then with a small round bur (No. 2 is what I usually use), undermine the enamel all round the cavity and with chisels and hoes break down the undermined enamel walls. Do not try to cut the enamel. It is very difficult to cut, dulls your instruments and prolongs your operation; but as the enamel walls are undermined it is astonishing how easily they break down. In cutting the dentin always cut with a sweeping motion—away from the pulp and not toward it. In

this way you very appreciably minimize the pain, and do not hold your bur on the dentin until it gets hot, for one of the greatest sources of pain in dental operations is the heat that is generated by a rapidly revolving bur, held firmly and too long a time, in contact with the tooth structure. With a sharp bur, rapidly revolved and swept along the cavity in lines away from the pulp, teeth can be excavated with comparative comfort that under other circumstances would be intolerable. Even if the decay is small, the cavity must be cut into immune territory, so in my practice there are no pinhead fillings in the approximal surfaces of the incisors, or indeed of any teeth. If the patients object to the cutting necessary to make a permanent filling, put the question squarely to them, explain the situation, and they will usually allow you to do that which you know is best. If not, then place the responsibility upon them and make them understand that you do not expect such operations to be of a permanent character. I have had very little trouble along that line, and am independent enough to tell such patients that if I cannot operate as I please I will not operate at all.

The cavity must be extended gingivally far enough to be covered by the gum tissue as it comes down into the interproximal space, far enough labially that the margins will be kept clean by the movement of the lips and excursions of food in mastication, far enough incisally so that the contact point will be above the margin of the filling and that the incisal margin will not be in contact with the approximating tooth and far enough lingually so that the margins will be entirely clear of the approximating tooth. This margin seems to be the vulnerable point in fillings in the approximal surfaces of upper incisors, judging by the many failures that I am constantly seeing in this class of fillings, and the reason is, that men do not cut their lingual margins sufficiently far. Most men seem to operate from the labial surface, open their cavities there and utterly neglect the lingual surface so that the lingual margins are in contact with the adjoining tooth, in consequence of which there is sooner or later a recurrence of decay at this point and the filling is a failure. Or if they do attempt to cut out the lingual plate they fail to cut it far enough to gain access for their plugger point from the lingual surface, and they are unable to properly condense their gold at this point,

and there is a failure through a faulty adaptation and condensation of gold at the lingual margin. All of this is obviated if the margin is cut wide enough to allow the operator to reach his cavity with his plugger point from the lingual surface. Fortunately we do not hear any objections to this doctrine now, as the men who decried this practice most strenuously a few years back are now cutting these margins a great deal more than we advise, that they may gain space to insert their inlays. If it is permissible to cut to gain access for an inlay it is obviously proper to cut to gain sufficient space to properly adapt and condense your gold. The most vulnerable points in this class of cavities are the linguo- and labio-gingival angles, and this is so because in the preparation of these cavities it has been the habit to round off these angles, thereby throwing them deeply into susceptible territory. Square out your cavity at these angles. Make the gingival seat flat with the gingival margin, conforming somewhat to the curve of the gum festoon; this will throw your angles out and free from susceptible territory, as indicated in Fig. 3. The interior preparation must follow the rule of square seat and parallel walls as nearly as possible. In making the flat seat care must be taken that it is flat and that it does not slope away from the cavity walls, as is the tendency in all beginners in this class of work, for if it does the tendency of the filling will be to slide out of the cavity, and the probabilities are that it will do so sooner or later. Neither should the seat incline toward the pulpal wall, for in proportion to the pulpal inclination of the gingival seat will there be a weak margin, due to the cutting away of the supporting inner dentin from the margin. The axial walls should be as nearly parallel as the nature of the tooth will allow. They will, of course, converge toward the incisal angle to form a point angle at the incisal retention. In Fig. 1 we have a labial view of the cavity showing the amount of labial extension. In Fig. 2 we have a lingual view of the same cavity showing the lingual extension, and in Fig. 3 we have a view of the approximal surface showing the gingival and the incisal extensions and the curve of the gingival margin and extension of the labio- and linguo-gingival angles. This view also shows the internal preparation with the flat gingival seat converging walls and their point angles, one the linguo-ginguo-axial

angle, another the labio-ginguo-axial angle, and the third the labio-linguo-inciso-axial angle. These angles are accentuated somewhat and it is permissible to deepen one or more of these angles as convenience points in starting the filling. Care should be exercised in this, however, in not making them too deep. Pits are not allowable for two reasons. First, they are a menace to the strength of the tooth and, second, are hard to fill perfectly, and if this is not accomplished there is left a vulnerable point in the finished filling.

The internal preparation of the cavity should be made with

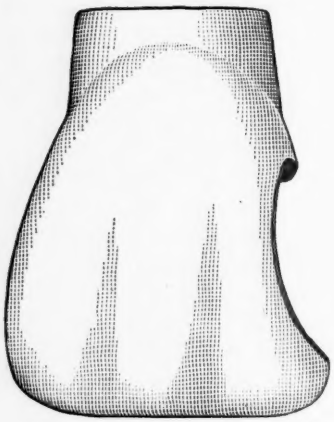


Fig. 1.

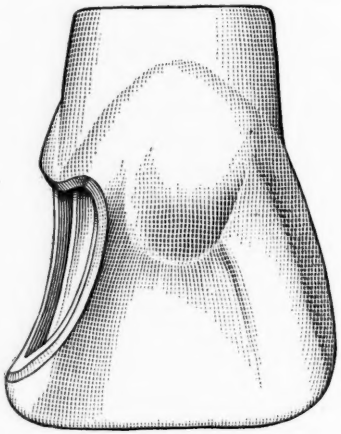


Fig. 2.

inverted cone burs and hoes. In this class of cavities I usually use a No. 35 or 37 inverted cone bur and, sweeping back and forth, obtain a flat gingival seat; with the same bur I then proceed along the lingual and labial walls and make converging walls toward the incisal angle. After approximating the desired form the bur is laid aside and the walls squared up with hoes of convenient size. In obtaining the point angles and in squaring up the walls a favorite instrument of mine is the No. 33½ inverted cone bur. Care must be exercised in using this instrument, for the object is not to make grooves and pits, and one can so easily do it with such a bur that I sometimes hesitate to advise its use, and yet it accomplishes the result so beautifully and so

expeditiously that I cannot refrain from recommending it, with the cautionary advice that its use is only to augment the work of the other instruments, and not intended for grooves and pits, for they are not allowable under any circumstances in this system of cavity preparation.

Fig. 3 alone shows the preparation of the cavo-surface angle. In the preparation of any cavity it is essential that we have an understanding of the anatomy and histology of the tooth. In the preparation of the cavity outline we must know the structure and arrangement of our enamel walls. It will be impossible for me

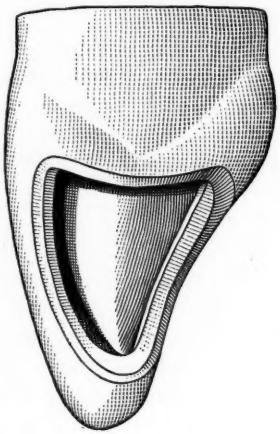


Fig. 3.

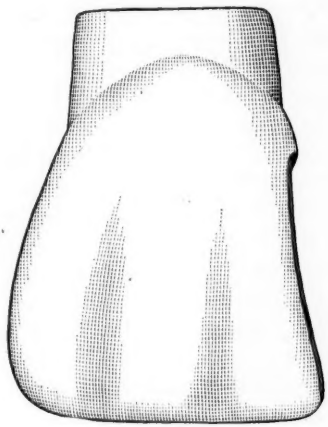


Fig. 4.

to take up the discussion of such a subject in these papers even if I were able to do it. Happily one that is able has most beautifully and exhaustively done this work for us, and I commend to all students Dr. F. B. Noyes' work in the American Text Book of Operative Dentistry. Suffice it to say that the cavity outline must be so arranged that there shall be no short enamel rods unprotected, for if they are they will fall out and leave a point of attack for the microorganisms of decay. No work on the enamel can be absolute, as there are so many deviations from the type; so if we have a general knowledge of the arrangement of the enamel walls we must supplement that knowledge in each case by the action of the enamel under our chisels, and with a

knowledge of the cleavage of the rods so obtained in each individual case, so lay out our cavo-surface angle that all rods may be protected. All the enamel margins should be well beveled, and this is best accomplished with a very sharp chisel or hoe. Under no circumstances use a sandpaper disk or any instrument that will polish the margins, for it is almost impossible to perfectly adapt gold to a polished surface.

We occasionally find teeth in which the contact is at the extreme incisal angle. In the preparation of cavities in such cases, if the usual line of procedure were adopted, we would have our contact between tooth substance, and the margin of our filling would be above the contact point, and, consequently, in the most vulnerable spot. To obviate this difficulty either one of two measures may be adopted. First, the cavity preparation already outlined may be used, but in making the fillings, supposing of course that there are cavities in the approximating surfaces of both teeth, a plus contact is made in such a way that the contact point is made with the fillings above the incisal margin, and then these angles can be rounded off with a sandpaper disk to more perfectly clear the margins of the fillings. If it is not advisable to do this for any reason, then the cavities can be made as already outlined, except that the enamel is beveled so that the filling can be built clear down to the incisal angle, thus permitting the contact to be made at that point. The contact, however, will be upon the surface of the fillings without encroaching on the margins. Such a cavity is illustrated in Fig. 4.

(To be continued.)

SOME PATHOLOGIC PHASES OF ALVEOLAR ABSCESSES AND THEIR TREATMENT.

BY GEORGE W. COOK, M.S., D.D.S., CHICAGO. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT FORT WAYNE, SEPTEMBER 8-9, 1908.

An abscess, in the strictest definition of the term, is a circumscribed area containing pus. Pus is a liquid-like substance, which contains dead leucocytes and various other tissue cells that have undergone degeneration. Pus in itself is a very significant factor and may be said to be one of the end products of inflammation

of tissue. It is usually alkaline in reaction and invariably contains many chemical compounds of a more or less toxic nature, though when freed from the organisms that produce the inflammatory condition, it is incapable of producing any of the inflammatory conditions that are so characteristic in the causation of pus formation.

The term alveolar abscess is so well defined that it scarcely needs any particular emphasis; it simply means an inflammatory process that leads to a destructive change in the tissue cells to the extent that we have pus formation. One of the perplexing phases of an alveolar abscess is the period extending from the time of the onset of the irritation to the final localized pus cavity. This period may extend from twenty-four hours to twenty and even twenty-four days. The period to which this process may extend depends upon a number of important factors. First, the etiologic cause and the tissues in which the infection has been located. The cause of inflammation cannot be attributed, so far as we know, to any other source than to that of a parasitic organism, which is, in the majority of instances, the lowest form of vegetable life known as a bacterium.

It might be well in this connection to mention some misconceptions in regard to suppurative inflammation. A few instances have been reported in dental literature to the effect that abscesses have been formed on the roots of teeth by calcific deposits. According to our best scientific knowledge of inflammation and its cause, we would never have an abscess formed on the roots of teeth from calcific deposits. While experiments have been made with various chemical agents and mechanical irritants to produce pus in tissue, no one has as yet satisfactorily proved that pus formation ever occurs in the absence of any parasitic agent. Some chemical agents have produced inflammation to the stage that we designate hyperemia, and in a very few experiments it has been reported that pus was produced by these chemical agents.

It was my privilege in the early part of my professional career to assist in experiments to produce inflammation and suppuration in tissue by chemical and mechanical agents, and in no instance did we produce inflammation to the point of suppuration in tissue by a chemical or mechanical agent, and in no instance were we ever able to produce what we could justly say was a suppurative inflammation. It was easy enough to produce pathologic changes

in the tissue, but not of a suppurative inflammatory nature. I have removed large calcific deposits and sterilized them by fractional sterilization, and introduced them under aseptic conditions into the tissue, which resulted in the rapid disintegration of the calcific deposits. But in a very large majority of cases there were present degenerative tissue cells, and in a few instances we produced what is known as calcific degeneration, which is a deposit of inorganic salts in tissue cells.

Everyone is familiar with what we know about the function of the pericemental membrane. The function that is the most important to us in this connection is that of building up of the cementum of the root of the tooth, especially in the early part of life, and after that period its next principal function is the physical retention of a tooth in the alveolus of the jawbone. By irregularities of the teeth or by the loss of teeth, it is possible to produce irritation of the pericemental membrane by malocclusion and in this way might produce a deposit of inorganic salts on the root of a tooth. But from cellular physiology and the phenomena that accompany such processes, it looks practically impossible for the inorganic salts to become deposited on the root of a tooth in a particular locality and there produce an inflammatory process to the extent that suppuration might occur. It is possible, however, for the functional activity of the cells of the pericemental membrane to degenerate into some former functional activity and produce certain pathologic changes whereby the tissue would become susceptible to an infectious parasite, and through no other way would we have an alveolar abscess, if our theory and experimental facts are correct upon the biologic phenomena of disease processes.

The pericemental membrane and its histologic structure contain a fibrous tissue with fibroblasts, cementoblasts, osteoblasts, osteoclasts, with a granular-like substance. It has been shown in other tissue containing practically the same elements that it carries with it apparently certain immunities. But the apical space which is usually the seat of infection is composed of a strong fibrous structure which radiates from the apical end of the tooth into fan-shaped fasciculi, which spread out in all directions to fasten themselves to the bony structure, with the principal blood supply of the pulp passing into this space. Usually the infection is carried into the apical space after the pulp has been practically destroyed, although it is possible for bacteria to be carried back into the

apical space before the pulp has become entirely disintegrated. The putrefaction of the pulp, which we might say is an infectious process, and the exudate that is formed at the apical end of the root of a tooth make a good habitat for bacteria, and there one organism might incubate long enough to produce a colony of bacteria to supply a sufficient focus for a rapid infectious and suppurative process. It frequently happens on examination of the tissues surrounding the root of a tooth that as soon as bacteria are present they attract by their chemotactic properties the leucocytes into the intercellular spaces, and possibly one or two of the leucocytes may take up some of the bacterium and carry them further back into the Howship's lacunæ. These lacunæ are regular indented depressions and quite frequently they are lined with a granular-like substance and most always contain osteoclasts. These so-called osteoclasts are most always multinuclear cells, and in these lacunæ are also small loops of blood vessels. These blood vessels at once become filled beyond their capacity, which must always produce an exudate into the lacunæ, and while this process is going on, the osteoclasts are busily engaged forming a bone, or, in other words, condensing the walls of the lacunæ in a short period of time. Sometimes it may occur in less time than it takes to tell how the process is carried on. Within the lacunæ we may have held in captivity a large number of bacteria, which are the source of a secondary inflammatory suppuration. It is quite impossible for one to say how long these bacteria may remain in this localized area and at some future time establish a secondary localized infection. It is these secondary localized infections that we so frequently have to contend with long after an abscess proper has been pronounced cured. These secondary localized foci may be observed an inch and a half from the original seat of infection, and the length of time that it remains in inactivity depends upon the kind of virulency of the organism present and the immunity of the tissues.

While inflammation or osteitis does not differ in general from other inflammatory processes, still there is always a modification on account of the density of the structure and the arrangements of the lacunæ. Many of the lacunæ in bone may become a source of infection in a large or small area, as the case may be, and there may be a large number of these infectious areas within a short space, and if they all begin at once in their active processes,

there must of necessity be a tendency to an active inflammation, producing all of the symptoms of the process in a considerable extended area, and in many instances will cause a periostitis. In some of these conditions we have an ossifying periostitis resulting in the formation of new bone from the inner layers of the periosteum. This is what we frequently find when we have an indurated mass of swelling, as it were; that is, over the outer surface of the alveolar ridge, or where we have had an active inflammatory condition in certain alveolar abscesses. This is called hyperplasia. This same condition many times is noticeable in the fracture of bone where the periosteum has reverted back to its original embryologic activity to form bone. This condition may exist for a long time and produce many points of difficult diagnosis. There are two or three points of differential diagnosis between this condition and a cystic cavity. First, as a rule, the hyperplasia following an alveolar abscess is, as has been said before, a mass of bony tissue apparently more dense than that in a cystic cavity. It also has more of a soreness on pressure.

It will be understood from the general description above given that this inflammatory condition and the sequelæ are more liable to occur in the slow processes of inflammation than where the periosteum of the bone has become involved. It is also characterized by alternate swelling and disappearance, or practically so, and then again in the course of four or five days the inflammation will become more active, alternating this way for several weeks without any decisive pus formation or any well-defined localization. This condition is due to the virulency of the organism that is producing the inflammatory condition and to the susceptibility of the tissue in which it is operating. All are most important factors in the causation and severity of the pathologic condition.

In alveolar abscesses we have to contend with a tissue that is vastly different from almost any other tissue of the body, and that is the pericemental membrane. We know that with slight irritation we can have the building up or resorption of the cementum on the roots of teeth. In these low infectious cases of periostitis and pericementitis we most always have a more active inflammatory condition than we do when the infection is in the bony structure of the jawbone. It is to these points particularly that we wish to direct your attention in the treatment of these diseased conditions. We recognize the hyperemic stage of inflam-

mation as a great factor in destroying the exciting cause of the inflammatory process. It is in this stage and by these points of circulatory action that we can establish a cure. In inflammation the first step is the dilatation of the blood vessels around the foci of infection. When the stage of hyperemia has well set in, then we have the venous circulation very much congested. In the early part of congestion is the time when the destruction of the infectious germ takes place by the phagocytic action of all the tissue cells in that locality, and especially with the white blood corpuscles. After the hyperemic stage, or the stage in which the destruction of the infectious germ has passed, we are then in the state in which infectious suppuration invariably results. It is in the period of hyperemia that we are sometimes able to abort the inflammatory formation of an abscess, not so much by medicinal agents as by mechanical means. When I say mechanical, I mean to remove as far as possible the source of infection. For instance, in a putrescent pulp as the source of infection, if we can remove all of the decayed dentin and the putrefactive agents in the pulp canal, we may assist the hyperemia in the prevention of suppuration. This depends to a greater or less extent upon the kind and virulency of the pathogenic organism present in the putrescent pulp. It will also depend upon the general physical condition of the individuals, their susceptibility or immunity to pus-producing organisms, to the quantity and kind of organism present, which will produce suppurative infection.

The organisms that produce putrefaction in the pulp of a tooth are not always prepared to produce suppurative inflammation. They can, however, produce inflammation to the stage of hyperemia, and when that stage has been reached, they succumb to the phagocytic action of the tissue cells. The cultivation and isolation of the bacillus of pulp gangrene with the staphylococcus pyogenes indicates that one is competent, when injected into normal animal tissue, to produce inflammation only to a certain stage, while the other is capable of actively producing suppuration. If they are injected separately, their pathogenic properties are not always positive.

I have repeatedly called attention to a number of agents that can be successfully used in the treatment of these alveolar abscesses. In the year 1898 I called attention to chinosol as an

antiseptic agent in suppurative inflammations, also to tricresol, and to the efficiency of crude phenol and crude sulphuric acid. They have been successfully used in the treatment of this condition for more than ten years, and today, with all the great splurge in therapeutics, antiseptics and disinfectants, these three agents stand out prominently and in the majority of instances are as beneficial in the treatment of alveolar abscesses for the general practitioner of dentistry as any other agents. If it were not for the damaging discoloration of chinosol, it would rank among the greatest of all dental antiseptics. When placed in teeth for an inflammation, at the stage of hyperemia, it will accomplish more than any other agent among the hundreds that I have practically tried in teeth and experimented with on animals. In well-defined abscess pockets tricresol is one of the next proficient agents for that particular stage of suppuration.

In the suppurative or slow process of inflammation and pus iormation, involving the bony structures with the tendency of localized infection of certain cancellated bony structure, a mixture of equal parts sulphuric acid and phenol stands out absolutely alone in that condition. It has a stimulating effect on the tissue cells; it is a destructive agent to all forms of bacteria; it has a tendency to penetrate the bony structure in which there may be secreted large numbers of bacteria, and in this way is one of the most potent agents in the treatment of this class of suppurative inflammation.

There are a number of agents which have practically the potent properties that these agents just mentioned have, but their source of efficiency comes largely from the so-called cresols. Lysol is one of them, but is not as efficient as cresol alone. However, it is important to note that in the conditions where chinosol cannot be used, lysol may be employed to advantage.

Strong antiseptics, such as those which have a tendency to destroy tissue cells when brought in contact with them, should not be used in the hyperemic stages of inflammation, for the simple reason that they do not destroy the bacteria, but render the tissue more susceptible to the action of bacteria. In other words, we should give the tissues support in the destruction of bacteria rather than lessen their phagocytic action. When the active stage of inflammation has reached the point where the hyperemic or active protective agent of the tissue has been lost

and suppuration is inevitable, one can gain the best results probably by taking thymol crystals and dissolving as many as possible in lysol and then making equal parts of formalin and the lysol solution. This has a strong antiseptic property and stimulates the tissue to an inflammatory condition in which we will have the reestablished hyperemia, or, in other words, we may have secondary hyperemia of the parts. Great benefit is sometimes derived by the application of a counter-irritant on the gum over the infected tooth, but, as a rule, this is very poor treatment except as a matter of temporary relief. Where the inflammation has extended to the periosteum and we have a fibrous periostitis, we can use the last-named agent with great benefit. The lysol has a saponifying effect on the dead tissue cells and thymol and formalin will have penetrating and antiseptic powers. While in the incipient stages of alveolar abscesses this agent in the hands of the majority of dentists would be rather harsh treatment, in that it would produce great pain and distress for a long time, I have observed, and experimental investigations prove, that the majority of individuals who treat putrescent pulps and alveolar abscesses produce more pain and prolonged agony by the lack of judicious applications of agents for this class of cases than in any other branch of dental therapeutics.

CONCLUSIONS.

The true exciting cause of suppurative inflammation is bacteria.

Suppurative inflammation varies in different tissue and depends on the different kind of bacteria.

As to the general differential appearance of the tissue in the various stages of inflammation, when the mucous membrane is a bright red, that is the early stage with dilatation of the arterioles. This is sometimes called the active stage of inflammation, but it is really the primary stage.

When the tissues have a bluish or purple appearance, it is considered the hyperemic stage.

In the primary stage, hot applications are painful when applied externally, but when a hot alcoholic solution is forced into the tooth it will greatly relieve the pain and act as a mild antiseptic, but a saturated solution of benzoic acid will give greater satisfaction in cases of arterial congestion.

In the hyperemic stage I have found nothing that gives as much

satisfaction as lysol-thymol-formalin solution, made up in the manner above described.

In this paper I have only attempted to give some pathologic phases of alveolar abscess. At some future time, I expect to discuss the subject, dealing with some other views of it and mentioning remedies in connection with an entirely different phase of the topic, considered both from a pathologic and therapeutic standpoint. The pathology and therapeutics of alveolar abscesses involve some of the most complex biologic problems known to the science of treatment of diseases.

DISCUSSION.—*George E. Hunt, D.D.S.,* Indianapolis, Ind.—Of course, this is a good paper, for Dr. Cook wrote it. However, I take it that the purpose of a discussion is to criticize those points with which one does not agree, as well as to commend those things of which one approves, and I will therefore use my right to criticize certain points, leaving it understood that I commend all I do not criticize.

I was rather amused at the able manner in which the essayist raised up a man of straw and the dextrous manner in which he swatted it to earth again. He advances an elaborate argument to prove that pus formation is due to microorganisms. If anyone of the slightest scientific attainments has denied that in fifteen years, I do not know of it, but Brother Cook seems to feel that someone has violently controverted it, and he therefore carefully erects this man of straw and proceeds to scientifically demolish it.

But while I cordially agree with his perfectly satisfactory conclusion that pus is due to microorganisms, I do not consider the experiment he recites, where he implanted sterilized calculus in tissue, proves it at all. Deposition of calculus is a constructive phenomena. Salts are precipitated from a containing solution. There will be irritation from the first and a degree of inflammation exactly proportional to the degree of irritation, but there will be no pus form until the pyogenes, aurens or albus, or other pyogenic organism, is present. The microorganisms are the exciting cause, the calculus simply a predisposing one. The calculus—a foreign body—lowers the physiologic resistance of the pericementum, enabling the pyogenic bacteria to functionate, and the product, or rather the result of their functionation, is the for-

mation of pus. Now, the essayist took that calculus, the result of a constructive phenomena, sterilized it, and put it under a dog's skin, or in some similar habitat. Of course, nature treated it as she does all irritants, when she can; she broke it down into simpler compounds and carried it off by the lymphatics. That was a destructive phenomena and simply proved that in those particular cases, the physiologic resistance of the tissues was sufficient to overcome the irritant. Had the calculus, after sterilization, been planted in a tissue and location permitting and inviting the deposition of *more* calculus, and consequently long-continued irritation, the chances are greatly in favor of pus formation there—not, however, until the pyogenic bacteria reached the spot, for they alone are the exciting cause of pus.

Now let me read you this: "In some of these conditions we have an ossifying periostitis resulting in the formation of new bone from the inner layers of the periosteum. This is what we frequently find when we have an indurated mass or swelling, as it were, that is over the outer surface of the alveolar ridge or where we have had an active inflammatory condition in certain alveolar abscesses. This is called hyperplasia. This same condition many times is noticeable in the fracture of bone where the periosteum has reverted back to its original embryologic activity to form bone. This condition may exist for a long time and produce many points of difficult diagnosis. There are two or three points of differential diagnosis between this condition and a cystic cavity. First, as a rule, the hyperplasia following an alveolar abscess is, as has been said before, a mass of bony tissue apparently more dense than that in a cystic cavity. It also has more of a soreness on pressure.

"It will be understood from the general description above given that this inflammatory condition and the sequelæ are more liable to occur in the slow processes of inflammation and where the periosteum of the bone has become involved. It is also characterized by alternate swelling and disappearing, or practically so, and then again in the course of four or five days the inflammation will become more active, alternating this way for several weeks without any decisive pus formation or any well-defined localization."

Does the essayist really want us to believe that formation of

new bone attendant on a productive inflammation of the periosteum will fluctuate, so that alternate swelling and its disappearance occur in from four to five days? Nonsense. There is nothing in common between the phenomena he mentions and the knitting of a broken bone. It takes from ten days to three weeks for broken bones to knit firmly enough for safety, and then the accumulation of excess cells, to which the essayist likens his fluctuating mass, which cells are really nature's splint for the fractured bone, persist for years—frequently until death. What the essayist has observed were masses of exudate from which the greater part of the fluids have been removed by the lymphatics. The very fact that it shows considerable soreness proves it to be an inflammatory exudate, not a bone formation. When he pressed on the swelling, the pressure was communicated to the sore pericementum. Of course, it hurt. After the recovery from the acute inflammation due to laceration and pressure subsides, the periosteum over a broken bone is not sore, even although it is still repairing the break.

Quoting again: "In alveolar abscesses we have to contend with a tissue that is vastly different from almost any other tissues of the body, and that is the pericemental membrane."

That is misleading and I am surprised so careful a writer as the essayist should leave an impression so far from correct. We members of the dental profession are too prone to imagine the tissue we work with to be different from all other bodily tissues—that the histology and pathology are unique and the treatment must also be unique. That is not true. The pericementum not only resembles the periosteum covering the ribs, the skull, the big toe, and all other bones in the body, but is identical with it. It *is* it. We simply call it pericementum because we desire to define the particular place in which this periosteum is found. It is subject to the same pathologic influences and the same remedial measures, any variation being due to the immediate environment and not to the histologic structure of the membrane.

Permit me to read again: "We recognize the hyperemic stage of inflammation as a great factor of destroying the exciting cause of the inflammatory process. It is to this stage and to these points of circulatory action that we can establish a cure.

"In inflammation the first step is the dilatation of the blood

vessels around the foci of infection. When the stage of hyperemia has well set in we then have the venous circulation very much congested. In the early part of congestion is the time when the destruction of the infectious germ takes place by the phagocytic action of all the tissue cells in that locality, and especially with the white blood corpuscles. After the hyperemic stage, or the stage in which the destruction of the infectious germ has passed, we are then in the state in which infectious suppuration invariably results. It is in the period of hyperemia that we are sometimes able to abort the inflammatory formation of an abscess, not so much by medicinal agents as by mechanical means. When I say mechanical, I mean to remove as far as possible the source of infection. For instance, in a putrescent pulp as the source of infection, if we can remove all of the decayed dentin and the putrefactive agents in the pulp canal *we may assist the hyperemia in the prevention of suppuration.* This will depend to a greater or less extent upon the kind and virulency of the pathogenic organism present in the putrescent pulp. It will also depend upon the general physical condition of the individual, his susceptibility or immunity to pus-producing organisms, to the quantity and kind of organisms present that will produce suppurative infection.

"The organisms that produce putrefaction in the pulp of a tooth are not always prepared to produce suppurative inflammation. They can, however, produce inflammation to the stage of hyperemia, and when that stage has been reached they succumb to the phagocytic action of the tissue cells."

That is a new one on me, if I understand the paper. It seems to me the essayist claims that phagocytosis is increased as inflammation is increased, and that, therefore, in what the essayist confuses as the "hyperemic" and the "congested" stage it is easier to produce a cure. Since receiving the paper I have tried to find a pathologist that agrees with the essayist, but have failed. Stengle, Wells, Green, Inglis, none of them mentions it. In the first place, the essayist's use of the term "hyperemia" does not accord with that of other pathologists. According to the three medical dictionaries, four general pathologies and Standard and Century dictionaries I own, hyperemia means "An excess of blood in a part." When a young girl blushes, that is hyperemia. When someone slaps your face and it flushes from the impact, that is

hyperemia. Does the essayist claim phagocytosis is increased by telling a young woman you love her or by slapping her face?

The first persistent stage in an inflammation is dilatation of the arterioles, followed by dilatation of the veins and lastly of the capillaries. Dilatation of the arterioles is produced by paralyzation of the vasomotor system and consequent relaxation of the walls. Paralyzation is due to the irritant or injury. The arterioles dilate first because their walls are most distensible. The increased amount of blood thus brought to the capillaries causes an increase of speed in the flow in the capillaries that it may pass through. This increases pressure on the vein walls, and the paralyzation of their vasomotor system causes them to dilate. This is hyperemia at once, an excess of blood in the part. In this stage the proportional relation between red and white corpuscles is not changed.

In the next stage, where the white corpuscles accumulate, first in the smallest veins and then in the capillaries, we have the proportion of white corpuscles vastly increased. It is not until this stage that chemotaxis is increased and a larger number of white corpuscles leave the vessels. Phagocytic action is now greater simply because there are more leucocytes to work on a vastly increased number of microorganisms. But this stage of inflammation is more difficult to cure than dilatation with increased flow, as they are progressive steps in a degenerative process.

I regret my inability to be on the floor in person, as there is more I would have been pleased to say on this fascinating subject of inflammation, but I have already said more than I should. Dr. Cook's therapeutics is most commendable.

Dr. Cook, closing discussion.—There is not very much to say upon the subject. Of course, Dr. Hunt's discussion was characteristic of him. He would not have felt satisfied without giving me a dig, and that is all right, he does not understand inflammation any better than I do. The fact of the matter is there are very few people who know anything about it anyway. But the stage of inflammation that I tried to designate here, the first flush of a maiden's cheek, is the dilatation of the arterioles. When that begins to fade away, in some instances, not so much in such cases as infectious inflammation, is when that tinge of red departs from the mucous membrane, then you have the stage in which

the destruction of bacteria that are causing that is taking place.

I am sorry that Dr. Hunt did not look up a little further on the question of the phagocytic action of tissue, because that is an extremely important question in infection. All tissue has a more or less phagocytic action. Of course, the white blood corpuscles are the active phagocytes because they are able to circulate. They are able to take up these organisms and carry them away to some little distance, where they can get assistance, as it were, from other tissues, or from other blood vessels.

Now, one point of the paper I wanted especially to bring out is the fact that when you have two or three days of an inflammation you do not always have an indurated mass over the inflamed part, but in some instances you do. Then you have a periostitis, or, in other words, the infectious material has reached the periosteum, and begins to form a bony substance. Now that formation may extend over twenty-four hours or twenty-four weeks

Now these cases of alveolar abscess that we find the difficulty in treating are just those cases in which the periosteum becomes partially involved and it tries to wall off; that is what it does, it tries to wall off that inflammation, to keep it from coming further into the soft tissues, and it will carry on that process for two or three days and finally it succumbs, and the calcific deposits laid down there are carried away or broken down by the exudate in the pus formation or in the serum, and then they can begin, and they carry on this process until they become acids themselves and then resorption takes place, and that is the time in which the treatment is the hardest to accomplish. That is the time when it is the hardest to cure the alveolar abscess or to stop the pain, and if it is not stopped very quickly the result many times is disastrous to the walls of the tooth, because when that condition is carried on for any great length of time there will be resorption of the cementum of the tooth, the apical end and the root, before these tissue cells have reverted back to the original function. The osteoclasts are again active and they are either destroying or building up these parts.

Dr. Hunt's remarks on the pericemental membrane are to me rather strange. He says it is exactly the same as the periosteum. In one sense it is, in another it is not. Microscopic study of the pericemental membrane shows that it has the tendency on one

side to attach itself to bone, and on the other hand it attaches itself to the cementum, and this network of blood vessels is of great complexity; that is why we have this rising of the tooth in the socket.

We ofttimes see that the tooth becomes elongated in these cases when we have a typical pus formation, or when we have inflammation; and this is due to this very fact that the pericemental membrane has two bony walls to butt against, as it were. It acts as the butt of the tooth against the alveolus, and there is no tissue in the body that resembles it as it actually is. Nor is there any tissue in the body so susceptible to inflammation. There are no tissues in the body so susceptible to certain organisms, and to say that it is exactly like the periosteum means that the author is certainly lacking in his histologic analogy of the pericemental membrane.

Now, the principal points of diagnosis in those cases are, first, to recognize these stages. Dr. Hunt's knowledge of inflammation is evidently one of book learning rather than due to histologic or microscopic study. The stages of hyperemia are the stages in which we have the greatest destruction in the area of irritation. The calcific deposits indicate a condition in the tissues and the enamel that would not take place in the so-called stages of hyperemia. They take place when the circulation is active, and the circulation is not active in hyperemia, regardless of what pathologists may say. I have a great deal of regard for a majority of authors on this subject, some of whom I have studied with more or less interest, but Dr. Hunt will find in McFarland's work that he lays great stress on the fact that the hyperemic stage is the destruction of bacteria, and that all tissues involved in that hyperemia are phagocytic in their action upon the bacteria.

LIMITATION OF CASTING MACHINE

BY W. E. KENNEDY, D.D.S., INDIANAPOLIS, IND. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT FORT WAYNE, SEPTEMBER 8-9, 1908.

The subject of this paper is rather misleading, perhaps, but the intent is not to place or draw any particular line that we must not go beyond. Rather the range of the casting machine

is so far-reaching that limitation is inconceivable. However, in all dental operations the operator is himself limited and in casting inlays we have no exception to the rule. Herein, then, is the subject matter of this paper.

I wish to give ample credit to the inventor of the casting machine, for a great achievement has, indeed, been done and the good and many advantages of its use are unmistakably far-reaching. Many are the hours saved to operator and patien ; tiresome, laborious operations made simple, with results often more satisfactory and permanently obtained. But I believe that in all the good that comes to us there is accompanying it at times an attendant evil to others. These others, perhaps, are the weaker beings; hence we still employ the old adage of "the survival of the fittest." I wish to particularly point out this attendant evil and see if there is not something we may do to overcome it.

It may seem strange that failure may come to some along with this the greatest invention of modern dentistry—an invention that revolutionizes many good and long employed methods. I believe there are those who will fail, or at least fall far short of success, by the heedless employment of the casting machine.

Long since I have contended that the beginner in dentistry should, as early and as rapidly as possible, strive to attain manipulative skill. This very necessary requirement, I also contend, is best developed by long experience in gold fillings. If we go over our path of training through past years and compare our present deftness of hand and touch with the slow, awkward stumbling of our beginning and remember and note how slowly but surely the evolution took place in our finger craft, I doubt if there is one present who will not say with me that the slow, painstaking manipulation of small pieces of gold foil or fiber into a well contoured and condensed filling has been the greatest factor in that development of all things else. Let us therefore work, gentlemen, for a higher perfection. Let us insert gold fillings and many of them, for I truly believe it is our salvation. Skill, not speed, should be our motto. Skill should be sought first rather than machines and devices that will hasten or make less our labor.

Manipulative skill is a prime requisite in all dental operations, in cleaning teeth and in prophylaxis, in cavity preparation and insertion of fillings, in pulp extirpation and canal filling, and last

but not least in the difficult manipulation of the wax for an accurate model for the gold inlay. Let us work out our salvation along the lines pursued by our able predecessors. In so doing we will develop another quality as all-important as skill, namely, judgment.

Lack of judgment is a second attendant evil that may accompany the advent of the casting device among the young inlay workers. There is no better way to develop our judgment than by doing dental operations of all kinds as done by our grand old masters. We have all inserted a large gold filling only to see it rock or dislodge before its completion. Something was wrong, but what could teach us better that a square base and parallel walls were necessary to retain that filling? Judgment grows with a bound with every one of these failures, and the more so because of the attendant labor. Judgment as to strength of tooth, cavity preparation and proper contour in restoration is as necessary as the tooth to operate upon. The mere procedure of some kind of cavity preparation, with some kind of wax model, and a resultant some kind of cast inlay set with a cement is pitifully insufficient; judgment should accompany every detailed step. Poor man who lacketh judgment, and alas! moreover, poor patient. Gentlemen, long, strenuous work of the laborious gold filling route is the stage-coach route to skill and judgment. The hardships along this rock-ribbed road will drive home impressions that will crown our efforts with success. The palace car service via the inlay route will develop few skilled and finished operators. The too easy doing of a thing once requiring strenuous labor and accurate judgment lulls the would-be aspiring operator into the coma of sluggardism and before he awakens the wreck train is clearing up his mistakes.

Unmistakably there is a woeful display of poor judgment in inlay work. We seem prone to overlook at least some of the essentials and trust too much to powers that be. The same inglorious mistakes are being made with the gold inlay as were made by the beginners of porcelain. The fact that the filling is to be placed with cement causes many to depend too much upon the latter to retain the filling. They also feel they are licensed to leave decay where the cavity is highly sensitive or overlying the pulp.

Extension for prevention is likewise overlooked. Also the flat base with parallel walls are too seldom obtained. Why these primary essentials of cavity preparation are overlooked is unexplainable. There is no reasonable excuse. It resolves itself to indifference, unconsciousness or dumbness of the man with the hoe type.

The same sane judgment should govern us in this work as is exercised in the best gold and amalgam work. First, we should always separate where decayed teeth have knuckled, that proper contour may be restored and the inlay properly set and polished. There are many methods, as you know, but I wish to mention one I use in extreme cases. Say the first superior molar is decayed mesially, second bicuspid is decayed mesially and distally, first bicuspid decayed distally. The arch is very crowded and the three teeth named, by knuckling, are trying to occupy the space required for two. Secure as much space as possible in one or two sittings, partially prepare cavity in second bicuspid, make an inlay for same and set temporarily. This gives something to push against and additional space is more readily gained and is a great assistant in retaining space while permanent inlays are being made.

Extension for prevention should be practiced with a free hand. All margins should be self-cleansing and the base of the cavity should be carried well toward and, in some cases, under the gum. The latter extension is often advisable where the inlay is to be used as anchorage for bridge work.

Third, removal of all decalcified dentin at all times and under all circumstances. I believe there is no retreat from this requisite whatever.

Finally, obtain a flat base, parallel walls with slight mechanical retention in cavity proper and in step. Use cement to true the walls when necessary or to give additional pulp protection.

With a cavity properly prepared our inlay technique begins. This has been ably discussed numerous times, but do we accomplish the detailed procedure satisfactorily? The greatest difficulty I have experienced is getting the wax to pass entirely to and completely fill the base of a deep approximal cavity. I believe we fail in this more often than we realize. Most operators have a way of their own of accomplishing this particular detail. But

whatever the method, do it. Use the magnifying glass and see and know that you have done it, and if you have not, throw the wax aside and try till you do accomplish this end. The technique of modeling the wax should be absolutely thorough, a smooth, dense wax model properly carved and contoured with the all-desirable feather edge at all margins must be obtained to insure the desired results. The way to do this is simple. Do it your way. Work at it and think while you work.

It is true many valuable points from others may assist you, but it is up to you to execute them. Space forbids my giving the technic of making a wax model. Diligent effort and thought will do you more good than anything else. Give attention to detail and after procuring a good model the procedure that follows is simple enough.

Summarizing, I wish to say that I do not discourage the use of gold inlays or the casting machine. The young man should purchase a good machine at his first opportunity. It is a most necessary acquisition. It has many advantages in crown and bridge work, the casting of cusps and numerous other prosthetic appliances. He should make some inlays also, but never resort to the latter too frequently. There is a limit to their use and we should all use discretion. If we think a gold filling would serve better in a particular case, let us not shirk the task but insert the gold filling. If we do this we will resort to the gold filling frequently enough that it will not become a lost art as many predict. The automobile has not, and I think will not, push the horse off the earth. Neither will the cast inlay supplant the gold filling. They all have their place, and rightly. So, let us use the best that is to be had in the best way we can and, as is always the result, the best will prevail.

DISCUSSION.—*H. R. Raper, D.D.S.*,——, Ind.: I realize very keenly that I am not taking the place of the man whose name appears on the program. However, it is my good fortune to be very closely associated with Dr. Byram, and I know that in voicing *some* of my views I but tell you what he has taught me. It chances, too, that I am an acquaintance of the essayist, and I knew about what he was going to say before he read it, and I knew I was going to agree with him.

The essayist tells us to use judgment when placing a gold

inlay. That's right. Judgment is as necessary as cement. In fact, an inlay set without judgment, though good cement be used, will come out.

Again agreeing with the essayist, it requires more skill to insert a good gold inlay than it does to put in a good gold filling, other things being equal. I find this true in my own personal experience, and students who are capable of inserting a good gold filling fall sadly when they attempt to make a cast gold inlay.

Dr. Kennedy tells us not to insert the inlay too often. Now, when are we to insert it? What is this cast gold inlay of ours to replace? We have been doing *something* with the teeth we are not filling with inlays. Naming the kinds of dental restorations replaced by the inlay in the order of frequency of replacement, it (the inlay) takes the place of large amalgam fillings in posterior teeth; it replaces some gold crowns; then noncohesive gold in approximo-occlusal cavities; then cohesive gold in compound cavities; seldom indeed do I use the cast gold inlay in the anterior teeth.

If Dr. Byram were here talking about inlays I know he would advise you to be conservative in your use of them. That is certainly good advice, and I give it, too, because I like to give good advice.

The inlay is an honest filling, and an honest filling is like an honest man—a success; it matters not how much of a failure it is. An inlay does one of two things: It preserves the tooth, or it comes out. I have three gold inlays in my mouth. I feel sure they are doing just what they were put there to do. Otherwise they would not remain in position. I also have some of my teeth filled with gold foil. What the condition of the margins of these latter fillings is I do not know. To make an honest filling you must be honest and accurate in every step of the work. The jug scheme of cavity preparation will not work with inlays.

By the way, Doctor, did you make the statement that you removed all decalcified dentin? Now, I would not do that. I assume that in decalcified dentin there is no active caries going on; it is simply discolored. If I can remove this discoloration without producing an exposure, even though I know it is only discoloration, I take it out; but, if it occurs in the bottom of the cavity—not along the margins from where it should always be

removed—and to remove it means to expose the pulp, then I leave it.

George E. Hunt, D.D.S., Indianapolis: I feel that I ought to be an authority on inlays whether I am or not. I doubt whether there is anybody in the United States that has swallowed as many inlays in the last six months as I have.

I had the honor and pleasure over three months ago to be the guest of the Cincinnati Dental Society, and on that occasion I read a paper quite similar to Dr. Kennedy's, except that I wasted more time in talking about other fads than the dental profession has passed through in the last fifteen years, as it has recently successfully passed through the porcelain fad. I can remember the Timme glass inlay which we had some twelve or fifteen years ago that would almost fuse if the patient had a bit of fever, it fused so low, and it really was a very delightful article to work, and for the first few minutes after it had been inserted it looked beautiful, but the patients had to hurry out of the office or it would certainly pit before they left the door.

I do not know of any set of men in the United States that is more prone to take up new ideas and work them beyond all reason than the members of the dental profession. I can recall five years ago when many of Brother Cook's confreres in Chicago were loudly asserting that porcelain was the only material to use in filling teeth. Those same men are not advocating that today, and even the class that were more conservative than they in their statements a few years ago are now using porcelain only to a very small extent. Now, there are men today using gold inlays that will not be using them in the same class of cavities in a few years to come, but it seems to me that the essayist struck a very important keynote in making a plea to the younger men to purchase a casting machine and acquire manipulative ability.

As to where I consider the gold inlay applicable, I will say, as did Dr. Raper, in the very large cavities in the molars and possibly the bicuspids, which we might otherwise fill with amalgam. I do not consider gold inlays at all applicable for use in the ordinary cavities in the anterior teeth, and certainly not in the simple proximal cavities.

W. H. Shaffer, D.D.S., North Manchester, Ind.: I do not know

that I have very much to say for several reasons. The first is I was not accorded the privilege of reading the paper and had no idea of the direction that this discussion would take. I never was very enthusiastic over the inlay process, and I never was enthusiastic over porcelain inlays. As to where the limitation comes in, I fail to see that the essayist has marked any point of limitation. If I were going to make any limitation at all it would be in the use of the casting machine for fillings. I doubt whether the limitation in the use of the casting machine in crown and bridge work has been reached.

G. W. Cook, M.S., D.D.S., Chicago: I just wanted to say one or two words. I wanted to say that I would advise Dr. Hunt not to come to Chicago until after this thing has wafted over, because he is so strongly opposed to the cast gold inlay proposition that I think he would hang to a telegraph pole if he were to get up there and make such a statement now. So I am just asking him not to come up right away.

I think that this paper of Dr. Kennedy's is one of timely importance. The limitations of the gold inlay are to be likened to what Dr. Hunt said about some of my friends in regard to the porcelain inlay. There are no limitations with some people. There are some practicing dentists who think that the gold inlay is one of the greatest things, and it is, in a way, that has been invented.

But the one expression in the paper that struck me as the most important phase of the subject was the advice to acquire manipulative ability. I do not believe that there is anyone who has not acquired the ability to put in a gold filling that can make a wax impression and properly remove it from the cavity and make a good cast gold inlay. They might do so sometimes, but the preparation of the cavity for a gold inlay and making the wax model requires the greatest manipulative skill that is known, I think, to the practitioner of dentistry. Therefore, in order that you may be a good gold inlay worker, you should keep in mind that the fingers must constantly be trained in the manipulation of gold. I think that where the great success of the gold inlay work lies today, is in the degree of the man's ability to manipulate anything in the mouth that he takes a notion to fill teeth with. Otherwise he cannot fill teeth with gold inlays.

D. E. Delzell, D.D.S., Logansport, Ind.: I have something in

my hands that is a great deal better than the explorer in getting these inlays out. I simply warm a probe and stick it into the wax inlay; hold that inlay, and insert the sprue wire until it is set, then hold the sprue wire with a pair of pliers, and pull it out a great deal better than any explorer that I have ever seen.

D. S. Hontz, Syracuse, Ind.: This is new work to me. I have not as yet made any gold inlays, and I will ask a question that may seem simple to some of you. But I want to ask if you use any substance to aid or prevent the wax sticking to the bottom of the cavity? Also, do you operate without the rubber dam?

Dr. Kennedy: To make the wax model I operate without the rubber dam. The saliva prevents any sticking of the wax. In fact, if you had one that would stick better you could make a wax model better and easier. The wax model does not adhere very readily.

— *Merchant, D.D.S.,* ————, Ind.: How can you remove the wax without distorting its shape?

Dr. Kennedy: It depends on the preparation of the cavity, so that it will draw without too much friction; and thoroughly chill the wax before removing.

Dr. Kennedy, closing discussion: When I wrote the paper my intention was to write one that I could understand if someone were to read it to me, and with that viewpoint I wrote it as plain and simple as possible. Even then some have heard and not been able to understand, or perhaps they did not hear me. Dr. Raper and Dr. Shaffer said that I did not indicate any point of limitation. That was the first sentence in the paper, that I would not mark any point or line beyond which we should not go. The limitation of the casting machine, as I partially said in the paper, is known—there is no limitation. As to an inlay enthusiast, I am one of them, and that is why I wrote the paper and urged upon those who may hear or read the paper to acquire manipulative skill sufficient to warrant their making an inlay some time in life.

Dr. Cook has gotten the main point of the purpose of the paper. It is to urge upon the young dentist or the older dentist who is not yet skilled in manipulation to "get busy." Acquire that necessary essential first as rapidly as possible, and, as I said,

the gold filling develops it more rapidly than any other. Dr. Raper said that it took the place of large noncohesive and cohesive fillings in posterior teeth; I do not want it to. That is why I wrote the paper. Those large gold fillings that strain every nerve and muscle in the body and make you perspire and develop those muscles in the forearm, are the ones we need to put in. Acquire manipulative skill. You should not allow that right arm of yours to lie down at your side and atrophy. These muscles must be developed, and the more accurate the touch the better can we model that seemingly easily modeled piece of wax. That is one of the hardest things that I have ever done; to make a wax model, one that I could call a perfect model. I have a blister here on my finger that I am proud of, from a gold filling I put in last week. It was one of the worst I ever put in. I am proud of that blister. The experienced man has one if there is an inlay machine in that town.

Dr. Raper mentioned decalcified dentin, and he confused it with discolored dentin. Decalcified dentin has microorganisms in it every time, further than you can gauge by discoloration. You cut down to the tooth structure where it looks clean, and then microscopically, I venture to say, you would find some microbes that by their product would cause decay. Dr. Johnson, in speaking of decalcified dentin, tells us what to do, and I would advise all to follow his advice, for I think he is right.

Gentlemen, if the paper will develop in you a desire to go ahead and make good gold fillings, I will think that I have done some good, and if it will cause a young man to buy an inlay machine and get busy, I will also think it has done good. I would advise everyone of you to get one.

Dr. Raper: I wish to acknowledge to Dr. Kennedy and the association my confusion of the terms decalcified dentin and discolored dentin. Decalcified dentin, as the name implies, is dentin from which the calcium salts have been extracted. It is hence softened and thoroughly diseased and should always be removed. Discolored dentin, if it is only discolored and not decalcified, may be left in the bottom of cavities.

DISINFECTION OF THE MOUTH.

BY K. E. HATCH, D.D.S., FORT WAYNE, IND. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT FORT WAYNE, SEPT. 8-9, 1908.

Mouth cleansing has long been practiced, but the full significance of it has only been recognized in recent years, since it has been known that the secretions of the mouth contained large numbers of bacteria—some pathogenic, such as give rise to serious infectious processes, and others non-pathogenic but associated with deleterious changes affecting the teeth and other tissues. Further study has now shown that frequently species of virulent bacteria are present in the secretions of healthy as well as diseased individuals. Thus as a means of controlling the spread of this infectious material mouth cleansing has come to be more and more seriously considered not only by physicians and dentists but by the educated public. Recently, in the hope of securing disinfection, simple cleansing has to a large extent been replaced by a variety of antiseptic procedures which have been adopted without much definite knowledge of their efficiency. The general problem has been studied, but these researches, for the most part conducted with faulty technic or based solely on clinical observation, have not been applied specifically to the study of different diseases. Accordingly, to determine the practical value of mouth disinfection, studies should be undertaken in the hope of securing data of specific import; and thus be able to discriminate definitely between the more efficient and the inefficient, even harmful, procedures, of which many have been widely recommended and extensively used.

The bacteria of the mouth are continually changing; large numbers are swallowed; others are thrown off in expectoration; and still others degenerate in the secretions or are taken up by the phagocytes and destroyed. On the other hand, the supply is being constantly replenished from the inspired air and ingested food, by the drainage of the nares and larynx through the mouth and pharynx, and also by the growth of species which develop in this environment.

The mucous membrane and anatomic arrangement of the mouth and pharynx are well adapted for the elimination of many of the

bacterial species which gain access to the secretions, but which are unable to develop in this unfavorable environment. They are also equally well adapted for the protection and harboring of certain other species which grow and become established in the secretions as harmless parasites. It is these bacteria, usually pathogenic although of varying grades of virulence, which are the most serious menace to health and the most troublesome in the attempts at mouth disinfection.

Fresh mucus has uniformly proved, in the experience of several observers, distinctly bactericidal, and it is significant that the mucous membranes which have pure mucus secretions are usually free from microorganisms, although they are more or less exposed to contamination. Furthermore, mucus diffuses slowly with foreign material, and, as a natural bland protection to the mucous membrane, there is no adequate substitute. In the nares, pharynx, trachea and mouth, irritation of the mucous membrane is immediately followed by an outpouring of fresh mucus; a flushing from within outward by a natural secretion which apparently meets all the requirements of an ideal wash.

Thus it is that the natural resources of the tissues, under normal conditions, are extremely well adapted for the protection of the individual carrying virulent pathogenic bacteria in the mouth as harmless parasites. One may well hesitate before disturbing the nice and well-perfected arrangement of Nature; but conditions arise in disease when it is evident that these natural resources may be greatly aided in reestablishing the normal equilibrium between the bacteria on the one hand and the susceptibility of the tissues on the other. And there, although for the time being themselves adequately protected, healthy individuals, if they carry about in their secretions dangerous bacteria, may become a menace to their fellows.

In the attempt to aid the natural resources of the tissues in the elimination of infectious material by mouth cleansing or disinfection there are several factors which render the problem both serious and difficult. The mucus which protects the mucous membrane from bacteria also protects the bacteria from the action of foreign substances. The removal of mucus exposes the mucous membrane to more or less irritation, which may be accompanied

by exudation, development of the bacteria in the secretions within, increase of virulence, and possibly infection.

Many antiseptics are irritants and in the mouth of doubtful value. Solutions to be used in the mouth should therefore be selected with care and should possess certain essential qualities. In general they should be bland to the mucous membrane, diffuse quickly with the secretions, and if antiseptic should be of known practical value.

Most observers in recent years advise approximately neutral reactions for mouth washes. Acids have been used. Bacteria in the fermentation of sugars form acid rapidly, and when certain percentages are reached growth stops and some species of bacteria die rapidly. On the other hand, Miller has shown caries of the teeth to be largely due to the acid fermentation of sugars in the mouth by bacteria, and it is now deemed better to neutralize whatever acid may be present rather than to introduce any more. Alkalis have been recommended chiefly on account of the more rapid diffusion with the secretions, but they have little or no action on the bacteria in strength which can be used with comfort in the mouth. To the gums and teeth they are generally considered injurious. The reaction of solutions to be used in the mouth should therefore be neutral or preferably slightly alkaline to neutralize whatever acid may be present.

Since many of the complicated solutions fail to do more than remove the contaminated secretions the use of plain water has been recommended. The body fluids, particularly those containing mucus, do not, however, diffuse well with water and the tissue cells undergo varying degrees of plasmolysis, although these are not serious objections to the use of water in the mouth; better results, it is well known, may be secured if the water be made isotonic by the addition of salts.

Antiseptics obviously should not only be efficient in destroying the bacteria, but bland to the mucous membrane and, if by chance swallowed or absorbed, harmless to the individual. The choice is thus limited. Nevertheless a great variety of antiseptics have been recommended by different observers. When such diversity of opinion exists, and when similar results are secured by different procedures, the efficiency of the antiseptics may be seriously questioned.

In the early experiments of Miller, and in the recent studies of Rose, portions of the mucous membrane were cleansed and remained sterile for a few minutes; but it was impossible even to approximate complete disinfection of the mouth with any of the long list of antiseptics tested. Miller recommended mercury bichlorid solutions. Rose condemned them and recommended in turn 60 per cent alcohol used with a brush as the most efficient antiseptic in the mouth. Other observers apparently have obtained excellent results with alcohol and advise its use in the mouth, but not stronger than 30 per cent, because in higher percentages its continued use desiccates and hardens the tissues. Although the antiseptic value of alcohol has long been recognized, it may be of interest to note, in this connection, that students of hand disinfection have recently come to look upon it as one of the most useful and efficient disinfectants employed in solving the intricate and difficult problems encountered in this field of investigation.

It thus appears that the results of former studies agree in but one particular, that complete disinfection of the mouth is impossible. With the methods employed no discrimination can be made between the rôle played by normal physiologic processes, aided by simple cleansing, and the part played by antiseptics in the elimination of bacteria. Obviously, the antiseptic could not be expected to accomplish the impossible, but apparently no adequate effort was made to determine their action under favorable conditions, and in view of conflicting results the varied recommendations and the substantial support given simple measures, it might be well assumed that many of the experiments were conducted with solutions antiseptic in name only or in lower dilutions.

Observations on the diffusion of the different solutions with the secretions of the mouth under different conditions show that the presence of salts, in isotonic quantities, was of positive, if slight, value. The rapid diffusion obtained with alcoholic solutions was greatly accelerated by the addition of glycerin. Heat accelerates the diffusion of solutions, and when used in the mouth it leaves the mucous membrane cleaner and fresher than cold solutions. Forty-five degrees Centigrade is about the maximum which the mucous membrane would bear with comfort.

Cleansing the mouth with simple salt solutions removes a cer-

tain amount of the secretions and with it some infectious material; but this does not destroy the bacteria. With the alcohol wash many of the bacteria are destroyed, the contaminated secretions are more rapidly removed and at the same time disinfected, and, finally, the natural resources of the tissues are more safely and efficiently aided in the elimination of infectious material. Alcoholic solutions containing glycerin and salts in bland quantities were in every particular more efficient than any of the washes hitherto recommended for mouth cleansing and disinfection, 30 per cent of alcohol being the strongest that can be comfortably and habitually used in the mouth and the weakest that will give reliable results.

From the hygienic standpoint the secretions of the mouth constitute the chief, if not the only, source of respiratory infection; and infectious material is transmitted from one person to another; in some instances through the air, as from sneezing or coughing, but to a much larger and more serious degree directly by personal contact or the use in common of the various accessories of life. In crowded communities and during seasons of the year when people are huddled closely together in narrow quarters the vicious cycles by which the dissemination of infectious material is fostered involve nearly every individual.

Whether it be for purposes of cleanliness or as a wise precaution in the care and preservation of the teeth, mouth cleansing of some sort will always be practiced.

The present researches, with reasonable precision, show that not only is the simple cleansing best effected with bland alcoholic solutions, but as disinfectants in the mouth these solutions possess practical value.

In closing I desire to say that I am not vain enough to hope that all of the foregoing conclusions will meet with your entire approval; for they are not based upon the garnered fruitage of years of ripe experience, but rather upon the theories as laid down in the books viewed from the standpoint of one who has had the opportunity of learning the invaluable lessons of practice for but a short term, comparatively speaking. But if you shall credit me with having made earnest endeavor to ascertain the correct deductions arrived at by modern dental science I shall feel repaid many fold for my labors.

DISCUSSION.—*F. R. Henshaw, D.D.S.*, Middletown, Ind.: I appreciate your asking me to open this discussion. Dr. Hatch has made a far more careful study of the bacteriologic and mechanical aspect of the mouth than I have ever done, and I would think there is no denying the fact that the methods of purification which are recommended are not only desirable but altogether necessary. I remember a few years ago Dr. Hunt made a long series of experiments in which he used mercury bichlorid as a germicidal agent, and of course a number of others. His conclusions, if I remember rightly, were that the most efficacious of all liquids which might be used as disinfectants or germicides was the bichlorid solution, and yet the difficulty of the introduction of mercury bichlorid into the mouth in solution sufficiently strong to be effective is apparent at once.

Therefore, the conclusion that Dr. Hatch seems to have arrived at, from the observations of others, as he himself admits, that preparations containing alcohol in a solution of 30 per cent were perhaps the most desirable, probably goes without saying.

The matter of mouth disinfection does not seem to me to be one of as serious moment as the matter of mouth cleanliness. I do not believe that mouth cleanliness and mouth disinfection could be in any way synonymous. It has been proved that the disinfection of the mouth is only possible for a very limited period of time, a few moments. It is only possible to arrive at a condition of complete asepsis for a period of a very short time. But there is a condition which can be arrived at and which is being attained from the hands of a class of operators who have certainly been long needed in the dental profession, that is not only perfectly desirable so far as the condition of the oral cavity is concerned, but one which carries with it more of permanence than any other. I refer to the operations leading up to oral prophylaxis. And I believe that those who have undertaken this particular field of work, who have schooled themselves in the matter of perfect and absolute cleaning of the teeth, will have, within a very few years, done for their patients more than many of us who are cobblers will ever have accomplished. I do not mean by that that I think every dentist should give up general practice and become a specialist in oral prophylaxis.

I thoroughly believe that a course of that kind would be utterly impossible for the large majority of us. I believe, in my own individual case, that I would not be fit for it; that it would be impossible for me ever to become a successful operator in the matter of oral prophylaxis. And yet there are people who are specially gifted in that particular direction and the work that they do is absolutely marvelous.

I happened to have had my own teeth cleaned and polished by a specialist in Indianapolis some time ago, and I do not believe that at any time since I was born my teeth were ever so clean. Since that operation they have been different; they have been more easily kept clean at my own hands. Therefore, I think that the field of dental cleanliness is greater for those who have taken up this matter, this specialty, than in almost any other particular.

The matter of mouth washes has been hashed and rehashed, and the virtues of many and various have been so thoroughly demonstrated that little or no argument is left on the matter; and I believe that it is only a question of a very short time until there will be little or no argument left in the matter of the virtue of oral prophylaxis. I certainly greet the coming of the day.

Geo. W. Cook, M.S., D.D.S., Chicago: I want to say in starting out that this is one of the most sensible papers I have ever heard on the subject. Just good common sense. As a rule when you hear a paper on disinfection of the mouth, it is by some fellow who has got a new scheme for killing these small microorganisms in the human mouth, and he has taken it out of some tree or beneath some large stone, that is perfectly wonderful, and when you try it for a while you find that the mouths are no nearer clean than they were before.

Oral prophylaxis, which Dr. Henshaw has spoken about, is really a new era in our cleansing teeth. I have contended for a long time that about the only way many disinfect the mouth is mechanically; that you need not expect that you are going to place an agent in the mouth that is going to kill these microbes, because a thing that will kill a microbe will hurt the tissues, and kill the tissues a good deal easier than it will a microbe, and if you do not believe this, try it.

The alcoholic solution that was mentioned in the paper I would

not altogether consider. I have experimented with alcoholic solutions in the operation of disinfecting mouths, but I have never met with the success that I would naturally expect for the reason that the mucous secretions of the glands of the mouth are arrested for such a length of time that I think in the majority of cases we do more harm even with the alcohol than we do with some other things. The advantage, perhaps, in the use of the alcoholic solution is this, that the alcohol cuts off the mucus. In other words, the mucus is removed from around the necks of teeth and along the margin of the gum a little easier with alcohol sometimes than with some other solutions. But the salt solution is still better for that than the alcohol. Most bacteria that are retained in the mouth after a thorough rinsing are held there by the mucus. Most of the bacteria that remain in the mouth for any length of time are retained there by the mucus secretions in the interproximal spaces and around the margins of the gum. And when it is not removed by ordinary water being rinsed around the mouth, it is because such mucus has been so closely attached to the teeth or to the tissue that it is not affected by these solutions.

I carried on a series of experiments with the mouth washes of all descriptions and water in comparison, and I found that I could remove a greater number of bacteria with water than I could with any other solutions that I tried to use, and especially with an isotonic salt solution. Now the essayist spoke of the salt solution plasmolysing the mucous cells. It also acts in the same way on bacteria. Only the salt solution will produce practically the same disinfection of bacterial cells that a 1:1000 mercury bichlorid solution will produce. The cell simply is unable to gain nutrition through the walls of the organism, and as such it soon dies from starvation.

Sometimes I have found in the various mouth washes that I have used that the agents in which I could not find bacterial growth on my culture dishes were agents that I removed also with the removal of the bacteria. With the agents remaining in the solutions I transferred a portion of that solution to my cultures, because where you get cultures, after thoroughly rinsing the mouth, you get them from underneath the margin of the gum, and from that place you would retain a certain amount of your antiseptics.

The series of experiments that I carried on some three or four or five years ago, a number of which have been published, show that I could not gain a better disinfectant of the mouth than with pure water under two hours. In other words, the person would have to hold in his mouth the solution for two hours in order to disinfect, or in order to destroy the bacteria that were there present. Of course to obtain absolutely accurate data on that question is hardly possible because of the fact that you have to work with the mucous membrane as well as with the bacteria.

Now, if you take about ten patients with different mouth washes and ask them to use them for a certain and a definite length of time and in a certain way, when they have used it for that length of time to begin with, test the saliva for its power to digest the starches, to break up the starches, and then after you have used them for a definite length of time test the saliva again, and in a very large majority of cases some change has taken place. What it is I do not know, but you can obtain the same digestive process in the digestion of starch in the action of the saliva. It has been suggested to me, however, that the reason why we get the action of the ptyalin on the starch is because of the action on the mucous membrane, but the difficulty is due to the fact that I could not get the same action in the use of the various mouth washes, and it has been suggested also that the reason was that my mouth washes acted on the mucous membrane of the epithelial tissues in such a way that they did not assist in the action of the tissues on the starches, which was most important.

I think this paper has brought out, and started a line of thought in the minds of a great many dentists, that we are trying to do too much with agents in the mouth in the way of disinfection. In the process of life the construction of the animal organism is such as to maintain, under ordinary circumstances, these bacteria that get into the oral cavity and cause the decay of teeth. After we discovered that these germs were the cause of decay of the teeth we at once started in to get something to kill them, and as a result, I believe, in a great many instances, the result of that determination, or the belief that we could destroy them, has been as harmful many times to our patients as if we had not done anything.

Now, in regard to cleansing the teeth, as mentioned by Dr. Henshaw, oral prophylaxis is one of the means, mechanically, of removing the place for these bacteria and keeping them out of the mouth. But then, apparently, teeth decay. I do not know, it is a question yet if we are not, in our great ambition to destroy the possibility of development of bacteria there, going to destroy also a certain amount of mucous membrane around the necks of teeth, and eventually produce the very conditions that we are trying to avoid. I believe, and I have seen in two or three mouths in the last year, conditions that were brought about that were serious in my mind, brought about by oral prophylaxis, and that was by removing or trying to remove the deposits around the necks of the teeth they also destroyed the physiologic function of the gingivæ, and that is the thing we try to avoid, especially in filling teeth. We always should restore the interproximal space and have no margins of filling to irritate the gingivæ, and then we start out with a stick and perniciously polish that as hard as we can and prevent the physiologic function of the tissue so that it finally recedes and constantly recedes until after a while the result will be resorption of the alveolus, and while we do not establish pyorrhea, we do establish that old process of resorption, or atrophy of the gum tissue, and the results we may see later.

George E. Hunt, D.D.S., Indianapolis: In regard to oral prophylactic treatment in which there has been trouble, caused at the gingival margin on account of the treatment, I will venture to say that the treatment was given by one who was unskilled. Skilful prophylactic treatments do not injure the gingival margin of the gum; on the contrary, those mouths are the most perfect mouths at the gingival border that you ever see. You never see such clean mouths, except in babies, as you will see in the mouths of those who regularly submit to a person skilled in prophylactic work. The treatments, after the first treatment, which may be a little severe, give you the best time in your life. It is the acme of pleasure to submit your mouth to the skilled prophylactic worker. After my first treatment I told the operator I felt I should go home and take a bath in order to get my body somewhere near as clean as my mouth. That is the feeling you will have after you get into the hands of a person skilled in prophylaxis.

Digests.

SOME CONSIDERATIONS CONCERNING ACCURACY IN TAKING THE BITE. By Charles R. Turner, D.D.S., M.D., Philadelphia, Pa. The term, "taking the bite," has so long been employed to indicate one of the fundamental procedures in the construction of artificial dentures, that it seems to convey the idea of the operation to which it refers more intelligibly than any other in common use, and its long usage seems to warrant its employment even by those who realize its lack of scientific accuracy and its inadequacy to express the various steps associated with its meaning at the present time. Using the term in its earlier interpretation, the subject matter of this paper may be fairly inferred from the title which has been selected for it. However, for the sake of clearness, it may be well to state more precisely which one of the various procedures included under the phrase, "taking the bite," it is our purpose to discuss.

In its simplest terms, "taking the bite," originally meant actually securing a record of the bite of a patient for whom some dental restoration was to be made. The patient was instructed to bite into a mass of some plastic material, such as wax, imprinting it with both jaws, and biting until they were established a certain distance apart, which was determined upon by the dentist as correct, and thus a record was obtained of their relationship in this position. The plaster casts were placed in these imprints and then attached to an articulator or to each other by plaster additions with a view to maintaining them in this relationship while the artificial teeth were being set up. Primarily then, taking the bite was simply securing a record of the relationship of the jaws in what was judged to be a satisfactory position of occlusion for the artificial dentures. But in addition to this, more data were necessary to insure an arrangement of the artificial teeth which was capable of satisfying all the requirements of function and appearance, so that now by an extension of the original term the measures by which

nearly all of these data are obtained have been included under "taking the bite."

For purposes of greater accuracy, the employment of bite-plates has succeeded that of the plastic material and the various other records just referred to are made by the use of these. First, the median line of the mouth must be recorded so that the center of the arch of the artificial teeth may correspond therewith. Then, as it is important to know how much of the future denture will be exposed to view in the movement of the lips, a record of this is secured in the so-called high lip-line, a line drawn upon the bite-plates which indicates the highest position to which the margin of the upper lip may be elevated. Some dentists mark the low lip-line, which analogously records the lowest level to which the lower lip may be depressed. A record is also made of the line of the upper lip when in repose, and this is usually done by having the lower margin of the upper bite-plate to correspond with it or to extend a fixed distance below it. This serves in determining the position of the cutting edges of the upper anterior teeth and in consequence the edges of the lower teeth, since it is desired to establish these in such relation with the margins of the lips as will appear most natural or most beautiful. As artificial dentures are to restore the external appearance of the lips and contiguous structures, it is necessary to obtain a record of the amount of fullness which their buccal and labial surfaces must possess in order to support these overlying tissues in the positions desired. This is secured in the contours of the corresponding portions of the bite-plate, which after trial have been found satisfactory in this regard, and which are to be rough models of the dentures in this particular.

While these records are sufficient to enable the prosthetist to arrange the artificial teeth in a manner which shall satisfy all the cosmetic requirements of the case, and in such a way that they will occlude when the mandible is in the position of occlusion, yet other data are necessary if the teeth are to be arranged to functionate properly in the various movements in which the food is masticated. The relationship of the jaws to the temporo-mandibular joint must be obtained by the use of the

Snow face-bow or some similar device, if the casts are to be mounted upon an anatomic articulator in correct relation with its joint mechanism. And if an articulator is to be used which is capable of individualizing the movements of its joint mechanism in imitation of those of the temporo-mandibular joints of the case in hand—and it is only by this means that we are able to arrange the teeth so that they will accurately articulate during masticatory movements—we shall require a record of the path of the mandibular condyles or its equivalent, as suggested by Christensen, for example. For lack of a better expression these operations have also been included by some under the term, "taking the bite," which now no longer gives full expression to these several ideas.

The most fundamental of these various procedures, and likewise the most important of them, is that of securing the record of the relationship of the jaws in the position of occlusion to be established by the future dentures, and as this is the most difficult of all these preliminary steps in denture construction, without which success in the others is of no value, and, furthermore, since the element of individual judgment enters so largely into its correct accomplishment, this has been chosen as a most suitable topic for our consideration.

Let us analyze the question to which we are to address ourselves in order that we may be able to approach it with a clearer understanding of the means we may employ in its solution. It is fundamentally a problem in mechanics, but the elements of the machine consist of living tissues, and as these are also subject to the muscular activities of the patient which in turn depend upon impulses derived from the central nervous system, it is evident that it is not a matter of pure mechanics, but closely bound up with the fundamental problem are some psychologic questions which have to be reckoned with, and these are of no small importance. In recalling to our minds what the mechanical question is, it will be necessary to keep constantly before us the dual nature of the problem.

When the natural teeth are present in the mouth there exists a certain position of the mandible in which certain definite relations obtain between the occlusal surfaces of the teeth when

they are said to be in occlusion. In this position one row of cusps of each series of teeth fits into the fossæ of the opposing series, this interdigitating establishing a very definite fitting together of the occlusal surfaces of the teeth, and, while it is maintained, fixing the mandible in a very definite position, which has been termed the position of occlusion. During the continuance of this position, the muscles elevating the mandible are in a condition of contraction only slightly greater than that in which they exhibit ordinary tone, and the mandibular condyles occupy the most distal position in the glenoid fossæ which they can assume. If the elevators are still further contracted there is a compression of the soft tissues intervening at the temporomandibular joint and of those about the roots of the teeth, but the teeth do not fit more closely together and the elasticity of the compressed tissues causes the mandible to return to its former position when the muscles are relaxed. There is still another position which must not be confounded with the position of occlusion, which is usually referred to as that of the resting bite. In this the muscles which move the mandible are in a condition of ordinary tonic contraction, the mandible sinks slightly from the position of occlusion but the teeth are in contact at one or more points, the lips are closed and are applied to the outer surface of the teeth, the tongue and soft palate are in contact, and a certain negative air pressure is established in the mouth which contributes to the support of the mandible. In the occlusal position of the mandible there is just enough contraction of the elevator muscles to support the weight of the jaw, and then the forces producing its movements are in a state of balance or equilibrium. In the normal state of affairs consciousness of the occlusal relation is derived from sensations transmitted by the teeth, which are exquisitely sensitive tactile organs, and from the absence of muscular strain. The muscular sense is by no means delicate enough to give this information, as the elevator muscles which are concerned in establishing this position of the mandible are designed for the exertion of great force and not for delicate movements. When one reflects that they are capable in some cases of exerting through the jaws a force of four hundred pounds or more, it is evident that the

delicate muscular sense necessary to tell the position of the mandible must be lacking in them. In the positions of the mandible when the teeth are in contact, these latter give instant knowledge of the relation borne by it to the maxillæ. If the mandible is not forward of the incising relation, the inclined planes of the occlusal surfaces of the teeth form guides which serve to insure its return to the occlusal position. The bearing between the teeth anteriorly, and between the condyles of the jaw and the glenoid fossæ posteriorly, serve to guide it into the occlusal position without difficulty.

When the teeth are not in contact we will still have in the temporo-mandibular joint a posterior guide in whatever movements that joint permits to the mandible. The position of the anterior end of the bone is under the influence of the muscles which produce its movements. Let us examine these two factors which are related to our problem.

The temporo-mandibular articulation is a condyl-arthrodial joint which permits a great latitude of movement to the mandible. It consists of the glenoid fossa, which at its posterior portion presents a concavity into which fits the condyle of the lower jaw, with the interarticular cartilage interposed between, and anterior to this a surface over which the cartilage and condyle may slide in the movements of the mandible. The head of the condyle presents a rounded articular surface which approximately fits the posterior portion of the fossæ, and which extends posteriorly to a lower level than anteriorly, by reason of which the mandible may rotate downward about the condyle. The condyle is attached to the rim of the fossæ by means of the capsular ligament to the center of which the periphery of the cartilage is attached. Above and below the cartilage are synovial sacs supplying the necessary lubrication for the joint. This arrangement permits the condyles to slide forward upon the floor of the glenoid fossæ, in which movement they are accompanied by the cartilages, and the mandible may rotate about the condyles, the cartilage always being interposed and offering a base for the rotation. These movements are bilateral. We also have in the lateral excursion of the jaw a forward and inward movement of one condyle while the other remains in the

distal part of its fossa and simply rotates about an axis approximately vertical. These are the limits of movement of the condyles as the capsular ligament binds it firmly in the socket. This ligament is thick externally and internally, by reason of which rotation is permitted, and yet the condyle is held firmly in contact with the cartilage. It is more lax anteriorly, but posteriorly it presents a collection of elastic fibres which contribute to pull the bone back into the fossa in its return movement.

Another anatomic peculiarity of the ligamenture of the joint is a factor in one of the movements of the mandible with which we are chiefly concerned in the consideration of our problem. This is the point of attachment of the external lateral ligament which extends from the root of the zygoma anteriorly downward and backward to the neck of the condyle. The nature of this attachment is one of the factors which causes the condyle to move forward in the movement of depression of the mandible, a characteristic feature of this movement with which all are acquainted. The point of insertion of this ligament upon the neck of the condyle acts as a fulcrum serving to pull forward the head of the bone as its anterior end is depressed. Of course this is not the only reason for the observed method of movement in depression of the jaw, the chief active factor in it being the pull of the external pterygoid muscle which is inserted into the neck of the condyle and its surmounting cartilage. This muscle serves to pull the condyle forward in the protrusive movements, acting simultaneously with its fellow of the opposite side; when the contraction of these two muscles is combined with that of the muscles attached to the anterior end of the mandible, depression of the jaw ensues, in which the bone rotates about a horizontal axis passing through the condyles, which latter at the same time slide forward, and sliding and rotation both occur during the whole movement. If only one of the external pterygoids contracts, one condyle remains in its socket while the other is pulled downward, forward and inward, thus producing a lateral excursion of the jaw to the other side.

Now in returning to the position of occlusion from any of these excursions, it is by the movement of retraction or of

elevation, or by a combination of both, according to the position from which the return is made. Normally this is accomplished by a contraction of the masseter, temporal and internal pterygoid muscles and sometimes in combination with the muscles attached to the anterior end of the mandible. By the contraction of the elevator muscles the body of the jaw is drawn upward and backward and the condyle slides up the incline of the glenoid fossa into its distal part. The attachment of the stylo-maxillary ligament and the elastic fibres of the posterior portion of the capsular ligament serve to cause the condyle to return to the distal portion of the fossa. The lower fibres of the temporal muscle, the inner fibres of the internal pterygoid and the posterior fibres of the masseter serve to draw the jaw back, opposing the action of the external pterygoid but not directly in line with it. For retraction to take place there must be complete relaxation of the external pterygoid. This muscle has the power of fixing the condyles at any point on their return path which the joint ligaments will permit, and ordinarily this means at any point but the farthest forward position of the condyles during depression of the jaw. The condyles being thus fixed by the external pterygoid, the jaw may then be elevated by the elevator muscles rotating in about the condyles. Tomes and Dolamore have shown that normally the path of the anterior end of the mandible in closure is constantly anterior to the path in opening the mouth. If the natural teeth are in position, as soon as these touch, they at once give information as to the location of the mandible and the return to the occlusal position is easy.

The complete loss of the teeth leaves the edentulous mouth without the means of judging accurately of the position of the mandible. There is no point of bearing anteriorly, and the balance established between the opposed sets of muscles producing its movements and the absence of strain at the joint are the only means which the individual has of judging of its position.

The individual for whom the bite is being taken is unable to assist in securing the mandible in a satisfactory position of occlusion, one of the conditions of which is that the condyles shall occupy their most distal position in the glenoid fossæ. Even

should there be a thorough understanding of what is desired, the patients no longer possess the means of telling when the mandible is in the position required, and when they do not understand, as is commonly the case, they are not only not helpful, but positively greatly hinder the efforts of the dentist.

After the loss of the teeth when a position of occlusion no longer exists, the change in the joint incident to this condition further complicates the problem which we are considering. The muscles are no longer accommodated to a fixed position of the mandible and the elevator group become somewhat shortened, as do all the tissues extending between the jaws. The ligaments at the back of the joints become very much stretched, so that in course of time the mandible can be elevated to touch the upper jaw. In some cases where only a few teeth have remained at the last, the ligaments become stretched in the effort of the individual to bring these teeth into contact for purposes of mastication, and sometimes this occurs more on one side than on the other. By reason of these conditions the articulation becomes loose and wandering, and this is contributed to by the absorption of the anterior portion of the glenoid fossa, which results in flattening of its floor and renders the protrusive movements very easy and those of retraction very uncertain. On this account the condyles may be forward of their most distal position without causing a strained feeling at the joint.

In the construction of artificial dentures for an edentulous case, if it were possible to tell what the former position of occlusion was, it is likely that this would satisfy all the requirements of occlusion of the dentures, but as, of course, we have no way of knowing what this was, we must determine upon some position of the mandible which will answer the requirements of the case. One of the demands upon such a position is that the condyles shall occupy the most distal portion of the fossæ. This determines the antero-posterior position of the mandible, and if the proper distance from the upper jaw be established, this is the position required. If the positioning of the jaw were under the control of the dentist instead of the muscles of the patient, this mechanical problem could be easily solved. As it presents itself the effort should be made to reduce to the lowest amount the patient's part in the operation, and

to increase the mechanical aspects of it which are under the direction of the dentist.

Let us first arrange these mechanical details. The relation of the jaws is to be obtained by means of bite-plates. These are temporary devices which fit the jaws and afford bearing surfaces between them. They should be made of some material which may be easily altered during their fitting, but which should be firm enough to retain its form in use, and it is very essential that the plates should be stably retained in their place upon the alveolar ridges, as accuracy in taking the bite depends on this to a large degree. The plates may be made entirely of modeling compound, or what is to be preferred, a base plate of metal or vulcanite upon which the alveolar portions are built up of modeling compound. When the teeth are to be mounted on a metal plate, this, of course, serves as the base for the bite-plate. Where an already vulcanized base-plate is to be used in vulcanite work this forms the base for the bite-plates. The alveolar portions are given the probable length and inclination which may be necessary for the case, but these dimensions are entirely tentative and are to be subsequently determined by trial in the mouth. After their retention in the mouth has been positively assured by trial, we are ready to proceed to their use.

The upper bite-plate is tried in and it should be observed whether its buccal and labial portions restore the contours of the overlying tissues. This cannot be finally determined now, but it may be roughly done as a guide in the subsequent procedures. The occlusal portion of the upper bite-plate should then be trimmed so that it extends one-sixteenth of an inch below the margin of the upper lip in repose, and posteriorly the surface should be slanted upward in accord with the probable curve of occlusion of the future dentures. After this the occlusal surface of the bite-plate should not be touched and all the trimming in the adjustment of the two done upon the lower plate. The anterior portion of this occlusal surface determines the position of the cutting edges of the upper anterior teeth and is to be preserved as a record for this. The upward slant of its posterior portion serves a purpose presently to be mentioned.

Then the lower bite-plate is tried in. The judgment as to the correct distance between the jaws which is to be established for

the future dentures is based purely upon the appearance of the overlying tissues of the face. These are the sole guide in deciding the question of the vertical position of the mandible. As the appearance of the tissues is affected both by the length of the two bite-plates and by their fulness, these two dimensions must be considered conjointly.

It is purposed to trim or add to the occlusal surface of the lower bite-plate so that it shall, when in contact with the upper, maintain the jaws a definite distance apart, while at the same time the external surfaces of the two plates confer upon the tissues of the lips such contours as are required. The tentative fulness of the upper bite-plate having been matched in a similar tentative fulness of the lower plate, the occlusal surface of the latter is to be trimmed or added to until, when in contact with the upper, the margins of the lips in repose are gently in contact. It is essential that the bite-plates shall be in contact evenly at all points on their occlusal surfaces, and this must be the case while the condyles are distally placed in their fossæ. This necessitates, on the part of the prosthetist, ability to tell when the mandible is in this position, or the measures which will enable him to get it there. Palpation of the head of the condyle and inspection of the skin overlying it are useful adjuvants in ascertaining its position. Asking the patient to alternately protrude and retract, besides enabling the palpating finger to follow the condyle, is apt to result in bringing the condyles completely back in the retractive movement, and when this has been judged to be the position of the mandible, the labial surfaces of the bite-plates are trimmed flush. With the jaws in the position in which they are flush, the occlusal surface of the lower is trimmed so that it comes approximately in contact with the upper evenly all around. It is preferable to leave it slightly longer behind and then, removing it, to soften this portion of it by heat, and returning it to the mouth to compel a closure of the jaw while the anterior surfaces are flush. This makes the plates fit evenly together. The backward slant of the occlusal surface of the upper favors a movement of the mandible backward rather than forward. When this has been attained attention may be given to the various details of the contours of the lips, which are affected by slight changes in the contours of the plates or their

length. As the bite-plates are to serve as guides for the dentures in the matter of these labial and buccal contours, time and attention given to this portion of the work is well spent.

When the dentures have been inserted, what appearance should the lips and checks have? When viewing in profile the upper lip should incline slightly out from its base at the nose, or in very old persons it may be nearly straight. It should extend slightly beyond the lower lip, the amount being dependent upon the retrusion of the chin. If the chin is far back the upper lip projects farther over the lower, and vice versa. About an equal amount of mucous membrane should be displayed in the two lips. The lower lip should be slightly everted as it rolls out, by reason of its contact with the upper natural teeth when they are present, and should exhibit the sulcus mento-labialis in cases in which this may be established. When viewed from the front the contours of the lips at the following points must be especially noted: At the canine eminence where considerable resorption has occurred the bite-plates must be built out to restore the lip contour. This can be judged largely by reference to the linea naso-labialis which is constantly present in persons of the plate-wearing age. The effort should not be to obliterate this entirely, as it is a natural fold in the skin, but to proportion its depth to age of the patient, the amount of resorption of fat in the surrounding tissues, and the other contours of the face. Any slight alterations in the plates to cause them to establish these contours may be made without affecting the distance between the jaws.

During these various procedures it is, of course, necessary that the condyles of the mandible shall be in the distal part of the fossæ, or the various details of contour will not be correctly adjusted. This may be judged by having the two bite-plates trimmed so that their labial surfaces are flush when the mandible is in the position, and also by marking the median line of the mouth upon both bite-plates. Any lack of correspondence of these in subsequent manipulations shows at once that the mandible is protruded on one or both sides. The occlusal portions of the plates are trimmed out on their lingual sides until they are about one-half inch wide, giving abundant room for the tongue in order that the plates may feel comfortable in the mouth.

Having arranged the bite-plates so that they maintain the jaws a fixed distance apart, and having a means of judging from them as to whether the mandible is protruded or not, we are ready to proceed to their use in securing the relationship of the jaws. It is commonly the practice to interpose some soft substance between the plates and to request the patient to close, the object being to fix the plates together in the movement. It is intended that the patient shall elevate the mandible in such a way as to cause the condyles to slide back in the fossæ in this movement. The anatomical difficulties in attaining this object have been pointed out, and it is necessary also for us to remember that one of the safest ways to insure an incorrect bite is to have a considerable amount of wax, or other soft material, interposed between the plates and necessitating considerable force in bringing the plates together. This is because in the exertion of force with the natural teeth the jaw is always somewhat protruded on one or both sides before it is drawn into the occlusal position. This is especially true if the interposed material is at the front of the bite-plates. In such position the resistance to the closure of the jaws reflexly calls into existence the movements that were useful in incision, and this is to be avoided in every way possible. In many instances the method may be successful, but the objection to it as routine practice is founded on the fact that it does not always result in giving the most distal position of the jaw. One of the devices employed to secure the backward movement is to ask the patient to swallow, in which act, as is well known, the mandible has to be fixed by its elevators to afford a base of operation for the elevator muscles of the larynx. This has a two-fold effect in pulling the jaw back, by the traction of the laryngeal elevators, and in accomplishing an act which is naturally performed with the condyles in the distal part of the fossæ. Another method is to request the patient to throw the head back and to close the mouth, which puts on the stretch the tissues below the mandible, thus tending to prevent its forward movement. Another is to ask the patient to close with the tip of the tongue held either back of the upper bite-plate or in a depression in it, the effect being to necessitate a backward movement of the mandible. Still another method is to ask the patient to bite the

back teeth together, a procedure only possible for a natural denture when the condyles are retruded. Any of these may be successful and none of them may be in a given case.

By an extension of this idea relative to forcing the jaw back, it is easy to see the origin of the various measures in which external force is used to secure the object. Pushing the jaw back by clasping the hands back of the neck and pressing on the symphysis with the thumbs is one of these methods. One operating in a somewhat different way but on the same principle is the use of Garretson's device which is recommended by Molyneaux The objection to these measures is that it is almost impossible to push the jaw back if the muscles pulling it forward resist, and this is usually a sure way to cause the external pterygoids to contract. If the muscles resist, no ordinary force can overcome them.

There alone remains the possibility of having the condyles slide back after the bite-plates have touched, and this may be done by having the patient alternately protrude and retract the jaw with the plates in contact. By thus observing the bite-plates and by an external examination at the position of the condyle the posterior position may be judged As soon as the mandible occupies this the bite-plates are to be marked on the side with lines continued from one plate to the other; the center lines must correspond and if the plates are not exactly flush, they are made absolutely so. The plates are then removed and grooves are cut at the site of the first bicuspid and first molar tooth on each side with a longitudinal groove between. Then the smallest quantity of soft, yellow wax is attached to the upper plate over the back groove and they are returned to the mouth and the patient is requested to close the mouth. If the anterior surfaces of the plates and the marks on them indicate that the mandible is correctly located, it is only necessary to fuse together the edges of the bite-plates, or to unite them with wire staples, and the record is obtained.

The wax is not for the purpose of fixing the plates together, although it serves to do this in part, but it presses the bite-plates against the mucous membrane, thus taking up any lack of adjustment in the fitting of their occlusal surfaces, and offers slight resistance at the back of the bite-plates, thus serving to have the muscles pull backward and upward as in mastication.

If the jaw closes forward of its proper position, asking the patient to swallow may cause it to retract, or the request to bite the back teeth together or to touch the posterior part of the upper plate with the tongue while closing. If none of these succeeds, alternately protruding and retracting, the jaw may again give the occlusal position, when we shall have to depend upon uniting them by fusing their surfaces, or by using soft plaster of Paris, as recommended by Ottolengui. This method then consists in arranging the bite-plates to fit in the position of occlusion, to arrange them so that the occlusal position may be judged from them and to get the jaw into the occlusal position without the exertion of an appreciable amount of force.—*Dental Summary.*

EVOLUTION, PROPHYLAXIS AND OTHER THINGS.

By J. P. Root, D.D.S., Kansas City, Mo.

"A fire-mist and a planet—
A crystal and a cell—
A jellyfish and a saurian,
And caves where the cave men dwell;

"Then a sense of law and beauty
And a face turned from the clod—
Some call it evolution
And others call it God."

All progress is simple evolution, and all evolution should be simple progress. My subject tonight deals largely with what I believe should be and will be the greatest evolution ever known in dentistry; its greatest drawback is its simplicity, and it will be more difficult to make converts than it would if there were intricate operations involved.

No new or startling facts will be presented; it is a simple case of "telling you the same old story," only I am adding some prophylactic statements pertaining to other subjects than dentistry with the hope that a better and more lasting impression may be made upon you.

With becoming and overcoming modesty I come to you from the West, a native product of the great rolling prairies of Kansas,

where my early days were spent in the company of the native aborigines, buffalo, prairie dogs and squaw papooses.

I have seen and participated in the evolution of a great section of this country. My short career has been long enough to see an unsightly shanty town on the banks of the muddy Missouri evolve into a city of palatial homes, magnificent parks and boulevards.

I have seen the little village with its one jerk-water train a day develop into a city which today is the second largest railroad center of the world. I have seen a large section of land, known in early days as a part of the Great American Desert, develop into the garden spot of these United States. As a ragged urchin I saw the first train leave over the prairies for the Rocky Mountains, displacing the famous coaches on the Santa Fe Trail.

I can remember the frame shack surrounded by a few pens to hold the long-horned Texas cattle driven overland from the Panhandle country to supply the river trade with cactus-fed beef, which was killed at the one small packing house at the mouth of the Kaw. Now these few pens have evolved into the second largest stock yards of the world.

Why mention these facts at a dental convention? Merely to show commercial evolution, a wonderful evolution, compared to the slight one we hope for. But such transformations are not to be marveled at, considering the section of the country, for as William Herbert Carruth says:

"A haze on the far horizon—
The infinite tender sky—
The ripe, rich tint of the cornfield,
And the wild geese sailing high—

"And all over upland and lowland
The charm of the golden rod—
Some of us call it Kansas,
And others call it God."

Dental evolution has not kept pace with commercial, mechanical or scientific evolution. Yet my faith is pinned to the greatest evolution dentistry has ever known, an evolution which will result in

nearly the elimination of crowns, inlays or other means of restoration.

How is this wonderful and apparently impossible evolution to be brought about? By the same procedure by which the entire world is to be revolutionized, by prophylaxis—by prevention in place of the cure.

The time will arrive when only a small per cent of the number of physicians, lawyers or dentists will be needed, compared to the present number, for then it will be the prevention of disease, evil and crime—not their cure.

These statements may seem visionary, but to one interested in the subject of prophylaxis and who has studied its different phases they are not visions, but expected realizations. Every newspaper, magazine, dental and medical journal fairly teems with prophylaxis. In medicine prophylaxis is in its infancy. Yet wonderful are the results.

Prophylaxis in Medical Practice.—Yellow fever, which had been accepted as the "Visitation of God," and yearly demanded thousands of lives, was found to be the result of the visitation of a mosquito; science and a few brave men soon eliminated the cause, and yellow fever has nearly become extinct.

The most remarkable hygienic work ever accomplished was that of Dr. Gorgas and associates at Panama. The Canal Zone was the most unhealthy spot in the Western Hemisphere; it was a vast graveyard. Those conditions were changed by simple prophylactic measures, so that in 1907 there was not a single case of yellow fever, and a 50 per cent reduction in malaria.

Smallpox is not classed as a disease much more to be dreaded than measles; inoculation and sanitation have made this change.

The bubonic plague, which for centuries has each year destroyed thousands of lives, was found to be the result of the bite of a flea from a rat. Now a systematic effort is being made to exterminate all rats in India, the home of the plague.

Thousands of children are born every year who a few days after birth become blind. Science has proven that if, at birth, there is an instillation of a one per cent solution of some silver salt into the eyes of these infants most cases of blindness of this character will cease to exist.

The greatest curse of this country is the great white plague, yet today it has been proven that the preventive treatment of an out-of-door life, night and day, will in most cases control and subdue the disease.

When Greece flourished as a world-power, malaria was almost unknown there, until a conquering army, returning from Asia, brought with them, not as trophies, but as unconscious avengers, families of fever mosquitos, which unquestionably were a large factor in the downfall of Greece, for today one million of the two and one-half million inhabitants of Greece are infected with malaria, a suitable country for prophylactic treatment.

Three hundred and fifty thousand cases of typhoid fever occur each year in this country, of which thirty-five thousand are fatal; it is estimated that 85 per cent of all cases are caused by water; to be more exact, caused by the simple process of drinking the excreta of others, as every case of typhoid fever comes from a previous case; and the *bacillus typhosus* of Eberth flourishes in all streams where city sewage is emptied, as well as in the thousands of wells from whose oaken buckets we quench our thirst with "pure, sparkling water."

The Missouri River, which furnishes Kansas City with its water, is a muddy or rather sandy stream, the color of the clay banks through which it runs. The popular opinion has been that this rolling mass of mud, sand and water purifies itself in so many miles of transit, yet the typhoid bacillus from the cities above us are landed at our table alive and active after their long trip, and the same species can travel underground through all kinds of filtering sands and earths, from the family vault to the awaiting well, and the prevalence of typhoid in country districts far exceeds that of the city in proportion to the population; yet some people wonder why some of us do not drink water.

Statistics prove that in war the bacilli and sewage are deadlier than bullets. In the Crimean campaign 50,000 were lost from disease, 20,000 from casualties. In the Russo-Turkish war of 1877-78, 80,000 died of disease, 20,000 from casualties. In our Civil War the proportion was three to one in favor of disease.

In Madagascar the French out of 14,000 men lost 7,000, and only twenty-nine of them killed in action. In the Boer war ten

Englishmen died of disease to one by bullet. In our Spanish war fourteen to one was the ratio. Statistics similar to this are innumerable.

Now notice what prophylaxis can do, and did do, and the results came from the hands and brains of a race we had up to a short time ago classed as semi-civilized. In the Russian-Jap war the Japs lost 58,887 in battle and 27,158 by disease, besides nursing back to health 67,000 sick Russian prisoners. Their medical corps was the most proficient of any in any army ever known.

The Pure Food Law passed by Congress and now being passed by most states and municipalities is one of the greatest prophylactic measures, as is the agitation taking place all over the country demanding pure milk. What a simple measure to have pure milk, especially now when it is not the style to feed babies as God provided for—at least it is not the custom with us, and we admit ourselves to be behind the East in style. Last year in Missouri out of 40,000 babies, 30,000 were fed on cows' milk, and four out of five infant deaths were caused by impure milk. The degeneracy of the mothers has caused the cow to become a foster-mother to the children. So under these circumstances humanity demands hygienic attention for the cow and its adopted children. Infantile life is natural, infantile death unnatural, yet thirty-three and one-third per cent of all babies die before one year old. Thus the necessity arises for the training of better mothers, or of giving our cows more hygienic treatment.

Statistics prove that in children two-thirds of the cases of deafness, more than one-half of all cases of arrested development, are the results of adenoids—an appalling result when you consider that their removal is nearly as simple and far less painful than the extraction of a tooth. Dr. Woods Hutcheson, the most active advocate of medical prophylaxis, claims that ten years of intelligent hygienic teaching would completely eliminate this, the worst scourge of childhood. Yet you have not heard of an uprising of the medical profession to accomplish such a simple end.

These are only a few instances illustrating what prophylaxis can do or should do. Yet with all this knowledge before us we continue to have these diseases. Primarily it is the fault of the physicians; they refuse, from ignorance, indifference and other in-

sane reasons, to become educated pertaining to prophylaxis and hygiene. We are as bad, yet our neglect is not as vital, but that does not excuse us from waging war for the extermination of diseases of the oral cavity, rather than to effect their cure after acquirement.

In mythology the goddess of health was Hygea, the favorite daughter of Esculapius, the god of medicine, and this fair lady, who should be enshrined in the heart of every physician as his cardinal saint, is almost forgotten in their wild efforts to cure diseases, which never would exist if the supposed teachings of Lady Hygea were practiced. In my section of the country the result would be a practice limited to hygiene, calomel and quinin.

Medical indifference to prophylaxis and hygiene is appalling. The dean of a medical college informed me they had lately added the chair of hygiene. The supposition is that this chair is a side issue and probably a very small chair. Common sense leads me to believe that if most of the chairs of a medical college were hygienic ones the teachings would be on a sounder basis.

The Moral Effects of Prophylaxis.—The elimination (partially at least) of the legal profession will follow the elimination of crime. Prophylactic measures toward preventing the growth of criminals are becoming popular. The establishment of free libraries, gymnasiums, baths and playgrounds, the doing away with crime-breeding tenement districts, the placing of embryonic criminals in charge of juvenile courts, cannot help but in time eradicate a large percentage of crime and criminals, as well as that necessary evil, the criminal lawyer.

It will be a slow process. For instance in the center of Washington, D. C., advertised as the most beautiful city in the United States, and soon to be the most beautiful city in the world, exist numbers of alleys labeled "Goat Alley," "Willow Tree Alley," etc., where one and two room shanties contain from eight to ten persons of the lowest morals. These are in the rear of prominent streets and surrounded by a supposedly good class of people. Twenty thousand inhabitants live in these alleys. Do you wonder that our beautiful Washington leads in death ratio from tubercular diseases, and is second in typhoid and malaria?

We must first clean up crime and disease-breeding surroundings;

dirt and dust mean disease; cleanliness and sanitary surroundings work for a better citizenship. In medical, dental or legal prophylaxis we must begin with the children. Even the popular movement for good roads has a perceptible bearing, for any community that neglects its roads will neglect its children. This may seem straining a point, yet if you are interested sufficiently to investigate this question, you will find ample proof of the correctness of this statement, and you may take pride in the fact that New Jersey was the first state to vote money for public roads, and your neighboring state of New York must believe in good roads, as they have provided a bond issue of $50,000,000 for the building of state highways.

Prophylactic measures for the protection, education and advancement of children are increasing rapidly. A few weeks ago our papers mentioned the arrival of "a drummer with nothing to sell." He was dispensing sunshine and happiness, and drew a salary from The Play Ground Association of America. His duties consist in visiting different cities and aiding in the establishment of public playgrounds. To me this is an ideal prophylactic measure. Another one is the Public Schools Athletic League of New York City, with a membership of over one-half million; the benefits have been so remarkable in the moral and physical development of the children that England sent over a commission to investigate the systems. Every city in the land is becoming awakened on this subject. Can you see what the results will be?

Preventive precautions can prevent most evils. The terrible disaster at Collingwood, Ohio, March 3, when one hundred and sixty-one school children were cremated, was the result of the criminal neglect of not providing proper exits. And what a wave of prophylaxis went over the country to prevent a recurrence of such a catastrophe elsewhere, yet what relief was this to the scores of parents left to mourn?

A few months ago a poor, lone man was sent from New York City to the penitentiary to atone for the loss of over a thousand lives; he should have been accompanied by a board of directors and some harbor inspectors; even then would the sufferings of the fathers, mothers, brothers and sisters of the victims of the loss of the *General Slocum* have been relieved? It was simply a few

score lives lost to save a few dollars to pay dividends on watered stock, when those few dollars spent for prevention would have saved untold suffering.

We are great money spenders, we have the finest fire departments in the world, we spend two dollars and fifty cents per capita to pay our fire loss; Europe spends thirty-five cents. Why this difference? Prophylaxis; simple preventive treatment. In Europe they demand and get fire-preventing construction; we have fire-fighting apparatus.

But we Americans are a careless people. We apparently value human life as our lowest asset. During the Russian-Jap war we marveled at the apparent indifference with which the little "yellow devils" went to their death, yet we daily take as many chances as they did; our careless disregard of human life has become a second nature.

When we consider such serious questions as these, one wonders how such an apparently trifling thing as oral prophylaxis can ever attract public attention sufficiently to become a fixture, but I am optimistic enough to believe all of these will be remedied. But they never will be if we sit back and wait for the other fellow to do the doing. If, to accomplish the desired reforms, we must become cranks, let us begin today to enter the kingdom of crankdom; we will find a few able men who have preceded us.

The Attitude of Dentists Toward Prophylaxis.—What must we do? First we must educate ourselves to the full realization and appreciation of what oral prophylaxis is, what it can accomplish; then educate our patients, then the general public. We must establish by law the regular examination of children, the compulsory attention to their requirements. This is not a new theory, but it is becoming a new practice, and with all other prophylactic measures must progress. The only reason, or reasons, I know of which retard our progress are the ignorance, indifference and selfishness of the dentists. Ignorance and indifference are inexcusable; selfishness worse. I have had supposedly good men tell me "Your theories are right, but not for me. I am not going to ruin my own business." This is what hurts, for the faithful following of prophylaxis will eliminate from 50 to 75 per cent of all dental operations, except the cleaning of the teeth. I would

class such a dentist as on the same plane with a physician who failed to cure a patient promptly, simply to acquire larger fee. The argument I use most frequently with my patients is: Their frequent visits lessen the amount of pain, lessen the amount of money spent, besides keeping their mouths in healthy condition.

Pride, false pride, is a great drawback toward successful prophylaxis. Too many dentists consider the simple cleansing of teeth a menial and inartistic operation, one beneath their dignity. For instance, on January 8, at the meeting of the Academy of Stomatology, Dr. William H. Trueman, in discussing a paper by Dr. A. W. Harlan, said: "Papers on the subject of prophylaxis are read in rapid succession, our journals are full of it, but are we advancing? Is it normal for a human being in civilized life to have a filthy mouth? If it is, the dental scavenger is legitimately on the program." There is the reason for neglect, the fear of being called a "scavenger," and when a man of Dr. Trueman's prominence can use such phrases, probably the fear is well founded.

Twenty-five years' experience in dentistry convinces me it is normal for civilized people to have filthy mouths; in fact, the higher the civilization the more tendency there seems to be toward predisposing causes for filth; this statement is verified in the colored race, and in all savage races who come under the benign influences of modern civilization. This is easily accounted for by the radical change in their mode of living, in the class of food they eat, such as soft breads, cereals, predigested food, etc., which lack the need of thorough mastication. Consequently the teeth, from lack of exercise, deteriorate the same as any other tissues of the body.

In advocating oral prophylaxis I am not advocating theories, but facts. My experience justifies me in believing that a great percentage of all oral diseases can be eliminated by its practice. For years I have doubtingly read the prophylactic doctrines of the man whom we ridiculed for his apparently visionary dreams; but his perseverance,the results he accomplished, began to convince others he was right, and today I give Dr. D. D. Smith, of Philadelphia, the credit of being the father of oral prophylaxis, and to him is due the fact that hundreds of us are practicing this procedure, where a few years ago he stood almost alone. While Dr. Smith

is more radical and positive than I, and our procedures differ somewhat, that is immaterial, as it is results that count.

The objection to limiting one's practice largely to the cleaning of teeth is a serious one to overcome, but to the honest dentist it must come in time. A dentist from a small town criticized Dr. Smith because he advocated the necessity for frequent visits to the dentist. He said: *"We are not here for the purpose of cleaning teeth. While it is efficacious, it is only adapted to a metropolitan practice. It is aristocratic in its inception, and Dr. Smith does a great deal of good to a few wealthy Philadelphians."* I am not acquainted with this man, but it is safe to say he is a pessimist.

The only successful prophylaxis treatment must entail frequent visits to the dentist. This is one of the essential features, and the cry of the country dentist that he cannot follow the practices of the city man is ridiculous. Yet it is the most common excuse made for bad procedures.

Also poverty (not extreme, but moderate poverty) is no excuse for long-delayed visits to the dentist, for frequent ones are a source of economy to the patient, and they are readily convinced of this fact. Also cleanliness is not confined to the wealthy, and while it may be aristocratic in its inception, it is a good, wholesome form of aristocracy suitable for all.

You may say I am optimistic. I try to be, and in my early days optimism regarding future feasts was often the seasoning of a humble repast. God bless the optimist, for this would be a sorry world if the census only tabulated a lot of woe-begone "I told you so" pessimists. For

"Twixt optimist and pessimist
The difference is droll,
The optimist sees the doughnut,
The pessimist the hole."

Pyorrhea Alveolaris.—A year ago I read before the Kansas association a paper entitled "The Treatment of Pyorrhea from the Standpoint of an Amateur." The pyorrhea specialists were unanimous in agreeing it was by an amateur; it did not increase my popularity with them; they took exceptions to the radical statement "that under any existing treatment pyorrhea cannot be

cured, but may be subdued and controlled;" that the unsettled questions as to whether the disease was systemic, local, hereditary, etc., or whether the patient had a kidney breath, were not considered; unsettled theories were laid aside and practical results sought for by the judicious instrumentation of parts, and the present subduing and future controlling of the disease. In making this statement regarding the cure, the question of what pyorrhea is must be considered. You cannot class gingivitis, or local inflammatory conditions from salivary calculus, as such. My decision is based upon the fact that I never cured a case, nor have seen one anyone else cured. By "cured," Webster's definition is meant, namely, "Restoration to Health," and no demand is made that lost tissues be reproduced, simply that remaining tissues be restored to health and remain so. The attempts to cure pyorrhea demonstrated that prophylaxis would prevent its recurrence. As to what causes pyorrhea I must admit my ignorance, which is as great as that of the so-called "pyorrhea specialists." C. N. Pierce says it is "a morbid action, characterized as a molecular necrosis of the retentive structures of the teeth." Those who have made scientific researches on this line differ greatly regarding the causes. Some claim it is due to a distinct microorganism, others that it is due to local causes. It has been proved and disproved to be systemic and hereditary, infectious and contagious. There is no question but that hereditary conditions exist with many, where there is a predisposition for infection, and I am inclined to believe it is contagious, for in my practice I find in nearly every case where husband or wife are afflicted, and their blood is not chilled, it is only a matter of time before the other succumbs. This is not quoted as a scientific fact, but simply as a fact.

Believing that the more my patients know regarding their troubles, cause, and results, the better they will follow my instructions, I explain, or try to explain, what pyorrhea is, what the results of neglect will be, what my treatment is, and the necessity of observing my instructions regarding future treatment by them and myself, and that if they do not feel willing to follow these instructions it will be useless to begin.

Treatment of Pyorrhea Alveolaris.—My theory is there is something to be removed and some congested tissues to restore to

health; so begin to remove and restore. Most patients come with an inherent dread of pain to be inflicted, so in first treatment aim to allay this dread, and also facilitate future operations by simply removing superficial deposits, and polishing coronal portions of teeth, frequently forcing, with compressed air, hot antiseptic solutions through the approximal spaces and any existing pockets. In a few days the patient returns with most of the congestion gone, the outward improvement more marked than at any other stage, and the dread of pain nearly eliminated. The treatment from now on is the thorough removal of all deposits (and my aim is not to class *cementum* as a *deposit,* a common failing among so-called specialists), each tooth to be finished at one sitting and left alone for restoration by nature and hygiene. The number of teeth finished at each sitting depends upon the character of the deposits, the difficulty of removal, and pain inflicted; as a rule, each sitting is limited to thirty minutes, never to exceed one hour.

I am not a Christian Scientist, yet I do not believe much in medication for any part of the body; so my therapeutic treatment is nine-tenths what may be termed "mechanical therapeutics," just instrumentation, gum massaging, etc. At each sitting, whether they be two or ten, the coronal portions of teeth are thoroughly polished with cups, brushes and orange wood points, and copiously flooded with hot solutions.

The patient, being served to the best of my ability, is again instructed as to future treatment, being guided by his tendency toward cleanliness of mouth, by predisposing causes toward recurrence of trouble, whether they shall return to me in thirty, sixty or ninety days, when they will be notified by card, and only notified once.

All patients, whether suffering from pyorrhea or not, receive these cards, and I consider this one of the greatest of prophylactic measures.

Proper Use of Tooth Brush.—The most essential as well as most neglected prophylactic advice to be given, is as to the proper use of the proper tooth brush. This advice is apparently neglected by most dentists, at least I have never had a patient who had been advised as to its use, and the common expression is: "Why have I not been told this before?" I also say why? To do this

satisfactorily I use a typodont form and what I term the proper brush, which is a large, stiff, corrugated one, which in use will cover the surfaces of the teeth. I object to brushes such as the "Prophylactic," a dainty little affair, with a projecting teat, which is supposed to go around corners, but in reality is a hindrance.

With the proper brush and typodont form the patient is shown how and why he must reach all surfaces, and instructed with the special need of brushing just before retiring, so as to remove any particles of food from interstices of the teeth.

I am a believer in the liberal use of tooth powders and advise their use on a dry brush; the fear of causing receding gums or abraded teeth does not deter me from advising my patients to use them, for if, to obtain and retain cleanliness, these results are produced, the benefits far more than offset any injuries.

The care of a brush is important. After being used it should be washed and dried and kept in a proper receptacle, such as the saniphore, which is a glass tube with a receptacle at bottom containing an antiseptic solution. The manufacturer of this claims all germs are destroyed; perhaps they are? But if not you can at least be assured that any remaining germs are your own. But you do know that your brush is clean and kept clean, and your own breed of germs are not contaminated by visiting ones from ma's or Aunt Hannah's brush.

The average American family are not millionaires, with a separate suite for each member of the family. We, "the people," as a rule have one bathroom, where, for the convenience of running water, we perform our toilet. Custom seems to have decreed that there should be a family tooth jar containing an assortment of hairless tooth brushes. Each brush, if it contains a sufficient number of hairs for breeding space, contains its own variety of bug. These, like the inhabitants of a tenement house, become friendly and visit each other. This not only changes the breed of the stock, but perhaps causes you to polish your teeth with some of your mother-in-law's microbes. There are a great many reasons why a "family jar," be it between you and your wife, or one for tooth brushes, is objectionable.

Very few appreciate the fact that the life of a tooth brush is, or

rather should be, a short one, only lasting a few weeks, and patients should be advised of such fact. You should select what you believe to be the proper brush, and have some merchant near you carry it in stock, and see that your patients purchase that particular brush, advising them according to existing conditions as to whether they use a medium, hard or extra hard bristle. The unholy desire of the average woman to shop at the bargain counter in department stores does not result in the selection of proper brushes.

Mouth washes are undoubtedly a good thing, especially as deodorizers and possibly as retarders of putrefaction, but not as germicides, except to a limited degree, for, if able to destroy germs, we would probably die first. I may be mistaken in this statement and hope such is the case, but test tube theories have not as yet convinced me.

But their use is advisable and you should advise the use of one with a pleasant flavor, with the idea that its frequent use would promote the increased use of the tooth brush.

The question is often asked of me, Is this system of prophylaxis satisfactory; do you get the results aimed at? Yes, and no. I obtain wonderful results for the faithful, and it is surprising how many fail to appreciate your efforts, yet the increase of appreciative ones is sufficient to encourage its continuation.

Unhygienic Fillings and Crowns.—Oral prophylaxis as practiced and talked of today deals largely with the cleansing of the teeth. This is the most important feature, but there are many things we do, and many we do not do, having an important bearing on the subject. The most frequent and least excusable cause of trouble is the elimination of the approximal space by the insertion of improperly contoured fillings. For years it has been my contention that as a tooth preserver no other filling equals amalgam. I also contend that not one dentist in ten knows how to properly insert amalgam, or if he does he fails to utilize his knowledge. The most frequent location for amalgam is in compound approximal and crown cavities in molars and bicuspids, where the approximal walls have broken away and the teeth come together, obliterating the approximal space. Prophylactic treatment absolutely demands its restoration.

This can only be done by ample preliminary separation, so as to restore proper contour, point of contact and space. The results of such operations need not be mentioned. You are all familiar with them.

The banded crown comes next as a trouble-breeder; not its use, but its abuse. The placing of a No. 8 crown on a No. 6 tooth causes trouble at the gingival border, the gold band cutting into the gum tissue instead of closely hugging. The men largely responsible for this are those who crown live teeth, as in probably ninety per cent of such cases it would be impossible to properly trim the teeth, owing to the pain inflicted, and even if possible the pulp would probably die from the orthophosphoric acid in the cement.

Bandless crowns cause less trouble, but when imperfectly adapted, such as having the crown either larger or smaller than the periphery of the root, a ledge is left, sure to be a cause of irritation.

Saddle bridges fitting too tightly or too loosely, bridges having inaccessible surfaces, impossible to cleanse, are frequently responsible for trouble.

Splints for Loose Teeth.—There is one form of prevention I am surprised not to see used more, especially as it is probably the most satisfactory operation I know of in dentistry. That is the use of splints to retain loose teeth, generally the lower incisors. I have made dozens of them; many have been in satisfactory use for ten and more years, yet I have only seen one made by anyone else.

As a rule it is men who are in need of them, and generally a condition exists where serviceability is desired more than artistic results, so in most cases bands are used. The incisors are trimmed at cutting edge with sandpaper disks so as to be perpendicular, a strip of thirty-gauge gold inserted so as to cover the labial and approximal surfaces, the two ends projecting lingually. These are pinched together with a pair of Angle pliers, removed and soldered, the projecting ends clipped off. After all are made they are placed in position on the teeth and an impression taken with modeling compound. This is removed and the bands carefully placed in it, in their exact position; investment plaster is run into

impression; when hardened soften modeling compound and remove. You then have your bands exactly as in mouth. They are soldered together on lingual side, trimmed and polished, and when cemented into position you have some immovable incisors and a delighted patient.

If for a lady or a particular man I use the Patterson method, which is far more difficult, but, when successful, satisfactory and artistic. This is made by boring holes through incisors and swaging thirty-gauge, twenty-four-karat gold to lingual surfaces, gold wires of exact size of holes are soldered to the swaged gold, and when completed it is cemented on lingual surface. The wires should be left long enough to project through on labial surface, and be grasped by pliers, to assist in pulling splint into position. When cement is set cut off wires, and grind off smooth.

Occasionally you will find upper incisors loose. In such cases destroy pulp, swage splint to fit lingual side, solder to pins going into pulp chambers, and cement into place. Probably most of you are familiar with these methods. They are only mentioned as a great prevention of the loss of these teeth. I have one case of a swaged splint covering eight lower teeth, solid on lingual side, partially cut out on labial. This was placed in position twelve years ago, and during that time the owner has been in office once or twice a month for treatment. Today the teeth, which have for attachment not one-fourth of the root, are as firm and in better condition than when splint was put on. Money could not buy this, nor purchase in any other form the comfort and satisfaction he has had.

Relation of Orthodontia to Prophylaxis.—Very few of us appreciate the bearing which orthodontia has toward oral prophylaxis. Undoubtedly in the majority of cases we correct or send to an orthodontist for correction. The question of esthetics is the one considered. It should be considered, but not alone. In all cases of irregularity there is malocclusion. Such conditions must result in the imperfect mastication of food, and be followed by stomach troubles eventually, besides the increased tendency toward decay due to impaction of food between crowded teeth, and the impossibility of removing same with toothbrush.

Examination of Teeth of School Children.—To remedy existing

conditions will be the work of many years. First we, the "cranks," the "dental scavengers" (God bless us), must thrust our old and new theories before you at every opportunity, until in self-protection you endeavor to prove we are wrong. This will result in your conversion, and add to the "scavenger corps." The national, state and local dental societies must make systematic efforts toward educating the dentists; then public laws must be passed and enforced pertaining to childhood prophylaxis. The men who do this will have many disagreeable stumbling blocks to cross; they will be adversely criticized, but in the end blessed. The only organized effort for the teaching of oral prophylaxis I know of is by the Sanitol Educational Association, an offspring of a commercial corporation. Their intentions may be honorable, but the commercial feature behind it cannot but be a detriment. But right or wrong, they have the correct ideas. One of their reports gives some figures proving the necessity for action on our part. At Alton, Ill., 1,594 children were examined; 1,109 had teeth needing filling; only 37 needed no attention; 680 had never been to a dentist.

We are far behind, instead of, as we should be, ahead of many other countries. New South Wales, an unimportant country, reported 73,000 cases examined in 1907, 94 per cent having decayed teeth. In the city of Strassburg 18,667 children received free treatment in 1906.

My only excuse for inflicting upon you such a medley is to impress you more regarding the importance of the subject, and that the paying of attention to the small details will often prevent great troubles. Very few of us appreciate the old adage, "A stitch in time saves nine," sufficiently to take that one stitch.

I agree with whoever said: "Man's greatest enemies are things so infinitely little that his unaided senses cannot appreciate them; and that the greatest blessings which human beings can confer upon their fellows lie in the domain of scientific sanitation, and I have the greatest longing to see the time arrive when we will be doing our share toward changing the diseased condition of the world into a perfect one."

Since listening to your president's address this morning, I am pleased to know that the progressive New Jersey dentists are

showing their progressiveness more and more, especially in starting the movement for the examination of children's teeth in the public schools. This, once begun, in a few years will spread to every county, then to every state, and oral prophylaxis will become a fixture.—*Items of Interest.*

UNBANDED VERSUS BANDED CROWNS. By Richard L. Simpson, A.M., D.D.S., Richmond, Va. Throughout my remarks the terms "banded" and "unbanded" refer to crowns having pins in the roots and some form of porcelain, for the sake of appearance. For fear that some may misunderstand me, I want to state by way of parenthesis that I believe that the gold-shell crown, if properly made, is the best and strongest substitute we can supply for inconspicuous places. To make it so, it is in a great number of cases necessary to insert a pin or several pins in the root and build up with amalgam. These pins make the whole root bear the strain, and prevent the crown from breaking off and carrying the coronal part of the tooth with it. The shell crown's strength is in the cusp, not in the band. For this last reason the dummies in bridge work must be attached to the cusps of shell crowns as well as to the bands.

To me the greatest incentive to incessant work is the thought that life is short and that there is so much to be done. My days are always too short. Then when I realize that many days of my life have been spent in doing useless things—things that could have been done more quickly, with less pain, with less expenditure of nervous energy, and at the same time could have been done better and made more durable, you can fully understand why it gives me pleasure to urge you to adopt a system of crowning teeth that will enable you to accomplish more, to do it with less pain; to do better and more beautiful work, and with far less loss of nervous energy.

In our efforts toward perfection we too often forget that complication does not necessarily mean excellence. This is especially true in crown and bridge work, and I am convinced that our very professional skill and ingenuity have been the cause of many wasted hours—wasted in doing what is useless.

The crown which I advocate as the strongest, most hygienic and

most beautiful is at the same time the simplest. It simply consists of a pin in the root, a gold plate over the end of the root, and a facing of your favorite selection.

There is no need whatever, neither is there any intelligent excuse, for a banded crown. Such an assertion on my part calls for some courage, since any early recognition that may have been accorded to me was on account of the banded crown. In fact, one of our latest text-books refers to my anatomically banded crown—"hat-brim method"—as "one of the most useful variations." In spite of my pride of achievement, truth demands that I repeat the statement made at the beginning of this paragraph, viz., that there is no need whatever, neither is there any intelligent excuse, for a banded crown. Fact is fact, stated or unstated. The most enthusiastic advocates of the banded crown claim only two points of excellence—(*a*) Prevention of root-splitting. (*b*) More secure attachment. This contention is like paying $50 to collect $10—a waste of time, money and nervous energy. If we had no substitute for the banded crown, there would be no need for argument.

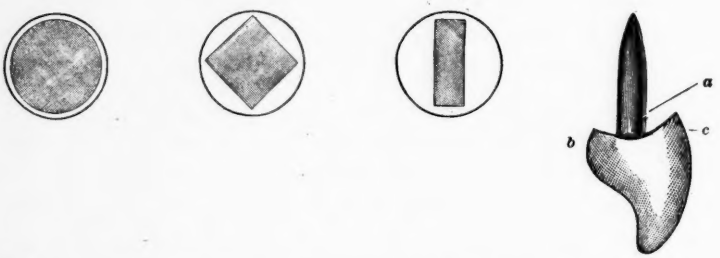
Before taking up the unbanded crown, let us consider the glaring defects of the banded crown. It is—(1) Difficult to prepare the root. (2) Painful to prepare the root. (3) Difficult to make the band. (4) Painful to make the band. (5) Difficult to adjust in bridge work. (6) There is unnecessary consumption of the operator's time. (7) Unnecessary consumption of the patient's time. (8) It is unsightly (as ordinarily made). (9) Irritating to the gum (as ordinarily made). (10) It adds no inherent strength to the crown. (11) It adds only slight strength to the attachment. (12) It adds no other protection to the root, which could not be more easily secured.

So you see there are ten points directly against it and the possible advantages in the last two points can be secured more easily, with less pain, and more quickly by other means, in the unbanded crown. Nos. 1 to 7 need no discussion. They are self-evident. Nos. 8 and 9 are also true, but can be overcome by making reinforced or anatomic bands, not hoops. The anatomic shape and accurate festooning will enable the gum to cover the labial part and remain in a healthy condition; but such work requires expert skill and Christian perseverance. No. 10 is easily

proved by cutting off the band of any crown or bridge, after which the remaining part will be of the exact strength of the original. No. 11 is also proved by the fact that very short shell crowns are hard to keep on, and pins have to be soldered on in the majority of cases.

Assertion No. 12 deserves most consideration and discussion, because those who use banded crowns do so because they believe that the results justify the difficult means. I am equally as earnest in asserting that the results would have been equally good, or better, if the bands had been left off in every single case. Some claim that the band keeps the root from splitting, and have ingeniously abandoned the labial half of the band, knowing that the lingual half is the part that really carries the whole root forward. This is good reasoning, but it is not carried far enough.

FIG. 1. FIG. 2. FIG. 3. FIG. 4.



Bands lead their advocates to errors, and so great is their faith that they even shorten their pins, depending upon the band. The band is not the foundation of crown work; the pin is the foundation.

Place a pin into the root, and a plate over the end of the root, and use the facing of your favorite selection.

The pin should be one of iridioplatinum, round, size No. 14 or 15.

I use *iridioplatinum,* because it retains its stiffness after being soldered, and does not oxidize, thus assuring a perfect attachment to the other part of the crown. Cheaper metals, such as platinoid, iridiumoid, or any other German silver compound, will not do, for the converse reasons.

I use a *round* pin for the convenience in purchasing it, for the

ease of shaping it so as to fit the canal, and for the ease of shaping the canal to fit the pin. This requires a minimum of cement and gives maximum of strength, because the round pin nearly fills the canal. Square or rectangular pins allow too much cement, they sacrifice strength at the expense of shape, and to be of equal strength necessitate too much destruction of the root. "A little learning is a dangerous thing." In earlier days someone started the idea that square or rectangular pins are stronger than round ones. And so they are, but only where their weights are equal.

Figs. 1, 2 and 3 represent canals of the same size filled with

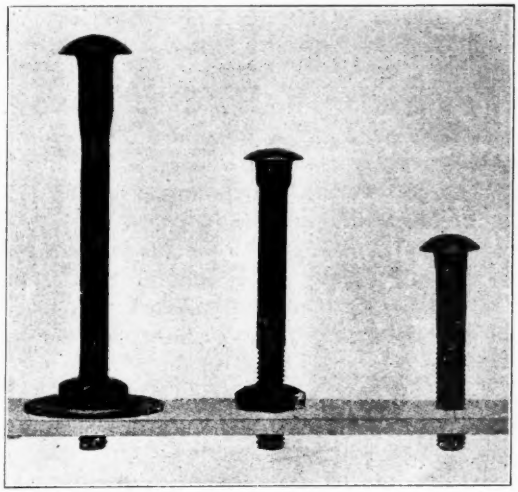


Fig. 5.

round, square and rectangular pins, respectively. A glance shows you the relative increase of cement space. Your common sense tells you that you cannot increase the strength of a round pin (Fig. 1) by cutting off its sides to make it the shape of Fig. 2 or Fig. 3. By so cutting you not only weaken it, but in the case of Fig. 3 render it liable to split out the sections of root which lie next to its short sides.

I use a *curved taper* of the shape shown in Fig. 4, because that is the shape of the root; because it allows a minimum cutting of the root; because of the ease of insertion of a bridge on

divergent or convergent roots, and because of strength and size where it is most needed. The greatest strain on the pin is just above the juncture with the coronal part. (Fig. 4, *a.*) Occlusion crystallizes the metal here, rendering it liable to break, and excessive strain bends it here.

I recommend size No. 14 or 15, for the reasons just given, and because experience has proved that smaller sizes bend and also form insecure attachments. Larger sizes necessitate unnecessary cutting of root and unnecessary expense. Size No. 14 or 15 is large enough for all purposes. To be retained by the cement it must be roughened. The best way to do this is to hold it in a pin-vise and shape it with a rubber-plate file, which gives it sufficient roughness. Nicking is injurious in that every nick is a notch which encourages a break.

Length means strength. Strength means permanence of attachment and root-protection. We know that the deeper into the ground a fence-post is placed the more secure it is. In the same way, the deeper we put the pin into the root the more secure the attachment becomes; the whole root then bears the shock of any strain. Length and size give all the attachment necessary. A single crown should have a pin at least as long as the facing. Leverage is thus equally divided between crown and root. A shorter pin puts the stress of the leverage upon the crown, and the root is liable to be split. Give all the advantage to the root, since by this method it can be so easily done, and does not add disadvantages. A new crown can be easily made, but a split root is a serious problem. In bridge work the strain on the root is still further increased and extra length of the pin means extra strength, making the whole root bear the force instead of putting it on the part of the root at the gum line. One-eighth of an inch more of pin length adds as much strength as any band.

The *plate* should be of gold 24-k., No. 34 gauge, because it is easy to adapt and forms no blue line at the joint, as does platinum.

Your attention is called to Fig. 5. This is a piece of board with three bolts of equal size screwed into it. The bolts are of regularly increasing length. Bolt C is the shortest, and is simply screwed into the board. Bolt B is also screwed in and has a nut screwed against the board. Bolt A is not only screwed in, but has a washer against the board and a nut screwed down upon it.

It takes very little pressure against C to split the board; B is longer than C and, therefore, the leverage in its favor is greater, but, in spite of this, more force is required to split the board than was used on C. The nut overcame the increased leverage. For A, the longest bolt, decidedly more force is required; in fact, when the washer is of the same size as the width of the board (the condition that exists in the mouth) the tendency of the wood is to twist in two rather than split. In the mouth no such exaggeration of leverage exists. This experiment and experience prove that if we have a long pin of ample size and a plate over the root end we have all the strength necessary, and bands are simply useless encumbrances. Sloping the root, as is usually done, still further increases the strength by taking the force off the frontal half of the root and transferring it to the posterior.

To make this experiment still more applicable it is only necessary to call your attention to the resemblance between bolt C and an ordinary pin in the root; to the resemblance between bolt B and a Davis or S. S. W. detachable pin, and to the resemblance between bolt A and a pin and plate crown.

But, aside from all this, bridge troubles are not so frequently due to split roots. Upon a properly constructed pin and plate you can mount with solder any facing which your experience teaches you to be best. For single crowns there is to my mind nothing stronger, more hygienic, more beautiful, or more easily repaired if necessary than a Davis or S. S. W. detachable pin crown mounted upon a so-called double plate and a double iridioplatinum pin base or cast gold base.

For saddle bridges the same teeth are used. For ordinary bridges Steele's facings have been a great comfort and would be more so if the cuspids and bicuspids were more like the natural ones.

Just where tooth and gingival margin join, both lingually and labially, nature has placed a slight protuberance on the teeth. (Fig. 4 *b* and *c*.) I call its protected area a "snug harbor," because in it the gum finds protection from impact of food, does not recede and remains in a hygienic condition. Usually unbanded crowns do not necessitate its removal, but if it should be removed, by all means restore it in your crown. In adapting banded crowns this protuberance is or should be always removed,

and the failure to reproduce it on the band is one of the chief causes of recession of the gum or gingivitis around a banded tooth. This even applies to shell crowns.

For the method advocated the following comparative advantages are claimed: It is—(1) Easy to prepare the root. (2) Painless to prepare the root. (3) Easy to make the crown. (4) Painless to make the crown. (5) Easy to adjust a bridge. (6) It saves the operator's time. (7) It saves the patient's time. There is—(8) No display of gold. (9) No irritation of the gum. (10) Maximum inherent strength. (11) Sufficient strength of attachment. (12) Sufficient protection to the root.

Thus there are twelve points in favor of my method and none against it. Don't hesitate—have full confidence! Let me persuade you—and in the same way as the delicate gum finds rest in its snug harbor, so also will the principles here outlined be a snug harbor to you.—*Dental Cosmos.*

THE ETERNAL QUESTION. By Dr. Pierre Marcel Wuillemin, Los Angeles, Cal. What is the Eternal Question? It is propounded by many and answered by many more, the answers depending on the point of view. We generally associate the eternal question with things feminine, but that is not the realm in which we will delve this evening.

Many questions are asked by members of the dental profession of each other regarding methods of operating, reliability of filling materials, efficiency of drugs, etc., but there is one question which not only dentists ask themselves, but which is put to dentists by their friends and patients and which is the hardest to answer and that is—"What are your fees?" And that is the Eternal Question. It is forever coming up at any and all times in one form or another and is the one question which is always uppermost. In the minds of the laity it seems to reign supreme, for we hear them ask of each other—"What did he charge you?" when conversing about dental operations. And it is the bugbear of those in the profession who place results obtained above money consideration. It places a limit on their work which ofttimes would not be present were not the question of money to be considered.

It is true that the majority of us are in this profession for the money there is in it, little or much as that may be, and it is time

that we should come to consider the business end of our work. Much time is being devoted to the improving of appliances to aid us in the performance of our operations and to remove as much as possible the discomforts which are ever present in the course of those operations. But little or no attention is paid to the financial side, except that occasionally it is suggested that we ought to charge a certain fee per hour without regard as to the relation of that fee to our necessary income.

As in all other business houses our work is based on the question of money, but it is not placed there in a scientific way, and I assure you that the successful operation of any business is a science.

It has been said that the average professional man is a mighty poor business man, and it is true. We do not have to go outside of our own offices to find the proof of that statement. How many of us know how much money we have invested in our business, and what percentage of profit we are deriving each year? We are prone to say that we took in "so much" money last month or last year, but the majority of us have not the slightest idea whether that represents profit or loss and the percentage of the same. Why is that so? Because the average professional man does not keep records which permit him to compute his income, his expenses or his investment, except in a very limited way. He cannot take a trial balance occasionally to discover whether he is progressing or retrograding financially. We may say that that is not necessary; that at the end of the year we have paid our bills and have a certain amount left over and that is all we care about. That is true, but during the entire year we have gone at it blindly, waiting until the time has passed to find where we stood as regards finances. Had we been able to ascertain that at regular intervals we could then have seen whether our fees were sufficient to permit us to reach the desired goal, which was to have your books show a good percentage of profit when that year's work was done.

How long do you suppose a business house could keep alive if run on such methods as the above? I am not desirous of exemplifying loose bookkeeping methods, but have taken this trend because it involves that eternal question of fees and wish to show you that this bugbear of fees can be handled very simply if handled properly.

We are going along in a sluggish way, speaking from the standpoint of the business man, and our fees are made to correspond to

the other fellow's because we want to keep our patients and get others.

The fact that Dr. A's fees are the same as Dr. B's means that, as far as patients are concerned, it is simply a matter of personality. Dr. A's patients go to him because he is Dr. A—other things being equal. But let Dr. A's fees be greater than Dr. B's and it then becomes a question of dollars and cents with the majority of patients. Were we sure of our position we would be indifferent as to the fees of our confreres, and would demand and get what we consider just and fair; but competition is not absent from our midst and brings about the doubt which makes us what we are. Now, what would be a business way of settling this question of fees? Let us see.

The investment which we put in our business consists of two items: 1st, that money spent in the acquirement of knowledge; 2d, that money spent in the acquirement of books, instruments, etc. In the first item, I would place the tuition of our college life and all fees paid for laboratory, dissecting room, state board examination, etc.; in short, money spent for things which we cannot dispose of. I would not include board, room and sundry expenses during the term of our college work, for those expenses would have accrued whether we were studying dentistry or not.

In the second item as stated, I have placed money spent for things which can be disposed of, but always at a loss, due to depreciation. All office fixtures, special appliances, books and furniture come under this head, but not materials to be used in the performance of our work, these coming under the head of expenses.

Therefore our knowledge is our stock in trade and the material things are but means to an end.

These figures then give us a basis on which to figure what our income should be, that is the dividends which we should pay to ourselves on our original investment. The interest represented by our income relative to our investment will be higher than in the ordinary business house for two reasons: First, because our first outlay is comparatively small; and, secondly, because we cannot increase it to any extent by the addition of extra appliances (a point very frequently overlooked by the average dentist in the purchasing of such things).

If, in a business house, a profit is shown at the end of the fiscal

year, that profit is often in the shape of stock in trade, and not always in actual cash, showing that the money has been reinvested in the business. With us, that is not possible. Our investments must be made outside of our field if we desire to get an income greater than that produced by our own work.

Now, the percentage of profit will depend upon the dentist himself, for the reason that from that profit he must pay his personal expenses and aim to set something aside each year for a rainy day. It must be in a certain ratio to the original investment, and conditions will tend to alter that ratio from year to year.

The first thing to consider is office expense. Under this head we put rent, assistant's salary, materials, breakage, wear and tear and the depreciation heretofore referred to and losses due to bad bills. Deducting this from our gross income, gives us our net income, and this net income is what has been called by the writer the percentage of profit.

We should decide what that percentage should be and *get it*. It can easily be computed, and from the figures obtained it is but a moment's work to ascertain the "per hour" fee so much talked of.

Let us assume that this result has been accomplished and that the dentist is getting remuneration for this work which permits him to fulfill the conditions required of a successful business. Time passes and the rent of his office is raised. Due to increased cost of living, he needs must pay his assistant a larger salary; he receives little slips from the dental supply houses which inform him that after a certain date such and such an article will be sold to him at an increased price, and he finds that the fee which a year ago permitted him to obtain the percentage of profit necessary to make his work profitable is no longer sufficient. What's the remedy? He works harder, puts in longer hours, tires himself, his work suffers, his health breaks down. This is not the proper way to cure the disease.

Another man purchases material of an inferior quality, in consequence of which the results obtained are not what they were, and his best patients leave him. Often discouraged, we see him going in the advertising business. All wrong. Still others slight their work, performing operations in two-thirds of the time which was previously required, with results quite similar to those mentioned above.

And why? Because, in their ignorance of what they needed, they did not know what to do. Had they been able to turn to their books, they would have found that the increase in their expenses was but a small percentage of the previous total expenses, and by adding that slight increase to their fees their ratio of profit would have been the same as previously.

We need not be highway robbers! But, having exact knowledge of what we must have to make our books balance properly, we must get it. If we cannot get it, it is because we are too timid to demand it or because we are unworthy of it.

These business lines must be followed in the running of our offices as they are in the running of any commercial enterprise. If the books of such a concern show a deficit, they immediately retrench, generally by cutting down expenses, a thing which is as difficult for us to do as it is for them to raise their prices on account of competition. But they do not wait a year before they figure their status. With the modern methods of bookkeeping, corporations with millions of dollars can tell each evening where they stand simply by posting up the totals. Of course, that is unnecessary for us, but there is no excuse for an absolute absence of such books, simple as they may be, and should I show you the figures obtained in my practice and the truths developed, I am sure you would think more seriously of this proposition.—*Pacific Dental Gazette.*

A FEW PRINCIPLES IN RELATION TO COLORS AND THEIR APPLICATION TO PORCELAIN INLAY WORK. By W. L. Fickes, D.D.S., Pittsburg, Pa. A porcelain operator will meet with many difficulties in his attempts to match the teeth if he be ignorant of the principles of light and color. A knowledge of these principles and their application to the arts should enable him to accomplish very pleasing results, which could not be attained without such knowledge.

The optical effect of the color of a porcelain inlay is dependent upon innumerable conditions and influences, some of which are uncontrollable, while others can be so modified as to produce, approximately, the desired effect. Many of the possible modifications are so slight that they would only confuse the operator were he to attempt to consider them. Those influences which cause barely perceptible modifications in the more intense colors need

not be considered in relation to the weakened hues and light tints of color which are used in matching the teeth. There are a number of influences which modify colors, however, which must necessarily be considered. These tend to confuse the beginner, but they are soon made to serve the purposes of the colorist.

Importance of Skill in the Perception of Gradations of Hues and Tones of Color.—The ability to imitate the various hues and tones of color of a tooth depends as much upon our susceptibility to the various gradations of color as upon our skill in the manipulation of materials.

Color is distinguished as possessing three attributes; namely, purity, hue and luminosity. The standard colors are those found in the normal spectrum. The purity of the color of a natural object is the proportion of white light to that of colored light emitted from it. The hue of a color depends upon the degree of refrangibility, or the wave-length of light. The luminosity of a color relates to its brightness, or the amount of light emitted. A color is at its greatest intensity, or is saturated, when it is at its greatest purity and of considerable luminosity. An excess of reflected light, however, would have a tendency to detract from the intensity of hue.

It has been found that the eye is so sensitive to changes of wave-length, or hue, that more than a thousand hues of the normal spectrum are distinguishable. Rood estimates that by one hundred slight variations in luminosity, and by further multiplying the variations of hue twenty times by additions of white light, the number of hues and the variations in their tones distinguishable to the eye is two millions, without taking into account all the possible changes which might be perceptible. If the trained eye can note these numerous gradations of color, we can readily see the possibility of improvement in the susceptibility of our own eyes, since the ordinary person can distinguish only a few of the more intense colors and a very limited number of changes in their tones.

It is only the delicate tints of color that we find in teeth, and in order to imitate them it is first necessary to be able to distinguish them. The slightest variation in hue or tone can be noted by the expert operator, and upon this depends, to a considerable extent, his ability to overcome color problems. It is therefore

imperative for the inlay worker to observe and study colors, and the various influences which modify their purity, hue and luminosity.

Pigments and Their Relation to Porcelain.—The color of a natural body is caused by the light which is projected from its surface to the eye, and is not contained within the body itself. It is the portion of light which the body rejects, and not that which it absorbs, which gives it color. Pigments are powdered materials used to produce colors, and they are mostly mineral substances. Each discrete particle of a pigment is, usually, a minute transparent body. These particles cause color by selective absorption. Each particle of a pigment may be transparent, and yet, when many of them are commingled, they may appear either opaque, subtranslucent, translucent or transparent. The color of porcelain is principally due to its chemical and physical constitution, and to the presence of pigments governed by the various phenomena of absorption, refraction, reflection, diffusion, etc., of light.

It has been found that mineral pigments are the most permanent, and of those used for the coloring of porcelain the most refractory are usually less liable to change their color in the mouth. Those made from mineral substances which are easily oxidized, or which are changed by the action of light, moisture, air, acids and other causes, have generally a lower fusing-point than those of the more permanent class. The variety of pigments used in coloring the so-called low-fusing porcelains is greater than that required for the high-fusing ones, as many pigments cannot stand the greater heat. These low-fusing pigments are a disadvtange, because they are susceptible to changes in the mouth. All the hues and tones of color required for matching the teeth are included in the higher-fusing compounds. An infinite variety can be produced by combinations of a few colors.

Application of Colored Porcelains in the Construction of an Inlay, to Imitate the Colors of a Natural Tooth.—All the pigments used to color the high-fusing porcelain bodies will mix, and innumerable combinations may be formed. The porcelain operator may mix all the colors of the high-fusing bodies with as much freedom as he can mix those of oil or water. The colors do not change materially during the baking process, except that they are developed to their full intensity. Mixtures of refrac-

tory porcelain colors, will, on firing, undergo approximately the same modifications of hue and tone as are produced by the mixture of oil or water colors of equal intensity of hue and tone. The results differ, however, to a limited extent, owing to differences in heat and in chemical composition. The colors will not be fully developed if underbaked, and they will be decomposed if overbaked. The color will be lightened by overbaking of the porcelain, either by chemical changes in the pigments or through the partial decomposition of the porcelain body. The weakening of the color, in the latter case, is possibly due to porosity. Porosity has a somewhat similar effect on light and color as has the pulverization of porcelain; that is, it mixes the various colored rays of light and thus produces white light. If all the essential requirements are observed, the operator need not fail on account of chemical changes in the pigments during the firing of the porcelain.

Porcelains are colored by metals and their oxids, and they are brighter, clearer and purer in hue and tone than are the secondaries and tertiaries made by mixing two or more colored bodies. For instance, blues are colored with cobalt and yellows with titanium, but the result of their mixture is a broken or gray green, which will not be as pure a color as that produced by chromium.

The Layer Method Compared with Other Methods.—The majority of porcelain operators are using the layer method, introduced by Dr. Reeves, in preference to other methods for the application of the body. There are reasons why the layer method is to be preferred. Porcelain bodies are all more or less translucent, and every layer of body, in succession, is influenced by the adjacent layers. The degree of modification is principally dependent upon the thickness of each successive layer, upon its position in the inlay, upon the degree of translucency of the body, upon the hues and tones of color, and upon the intensity of the colors. These are all guides to the final result. The varying thickness of the layers has an influence on the final color, and a knowledge of that modifying influence is more easily acquired because we have the measurement of thickness as well as color to guide us.

We get purer colors by the layer method, and the modifications in color are more easily understood. The direct mixture of the

bodies, by absorption of additional rays of light, produces a greater percentage of black than would result from the use of the layer method. Light tints may easily be deepened by mixing, but dark tones cannot be made much lighter. The raising or lowering of the tone is more readily controlled by baking in layers. The final color is produced by successive steps, and it is possible thus to make modifications at any stage up to the final layer.

The porcelain worker should experiment by making many combinations of colored bodies, in layers of varying thickness, and of mixtures. These combinations should be of varying intensities of hue and tone. Misgivings and doubts will soon disappear, and the operator will gradually work with greater confidence and skill.

Influences Which Are Uncontrollable and Which Have a Tendency to Detract from the Beauty of the Completed Filling.—There is a difference in the optical density and in the physical and chemical characteristics of porcelain and of a natural tooth, and for this reason it is impossible to so construct a porcelain inlay as to produce the same color effect of hue and tone under all conditions. Many influences modify the color—these are differences in the source of light, the position of the filling in relation to the source of light, the relation of the filling to the aspect from which the observation is made, and differences in the structure of the eyes of observers, etc. Therefore it is possible to produce an inlay which will exactly imitate the hues and tones of color of a natural tooth only under certain definite conditions. When these conditions change, the color will be modified. These changes, however, are usually so slight that if the inlay is a perfect match in hue and tone under certain ordinary conditions, it will not depart far from a natural and lifelike appearance under the varying conditions mentioned.

The color of an inlay is also modified—(1) By the variations in the composition and intensity of the light with which it is illuminated; (2) by the several kinds of contrast, as by contact with other colors or contiguity to them; and (3) by contrast of complementary colors from the ocular spectrum. The color of an object is modified by the light reflected from adjacent objects. The juxtaposition of its complementary color will raise a color to a higher point in the scale of tone. For instance, a gray green will assume a more vivid tone of green by the close proximity of red

in the pink gum enamel. If an object is red under a pure white light, it will incline to orange if it receives green light from other objects. Yellow light added would make the tendency to orange more pronounced, but if the added light were blue or violet, the red would become crimson or purple. If we look at a colored object and then turn our eyes to another, the color of the latter will be modified by the complementary of the first color. These are only a few of the influences which modify colors, and each has some bearing on our work.

The local color, or that which is dependent upon the nature of an object, is more constant if the surface of the object is rough than it would be if it were polished or glazed. Therefore an inlay should be fired until it is just short of a full glaze. A slightly uneven surface, as well as the full strength of the porcelain, can be developed by firing for a longer time, at a lower temperature, than would be required for developing a perfectly smooth, glossy surface. It should be glazed, and yet have minute conical elevations. These elevations on the surface of the porcelain reflect the light in all directions; hence the local color is not so greatly influenced by changes of position in relation to the source of light, by changes in the relative positions of the inlay and the observer, or by modifications in the source of light, as it would be were the surface highly polished or glazed.

Effect of Light or Exclusion of Light on the Color of a Porcelain Inlay in Respect to Tone.—When white is added to a color or hue, the result is a tint of that color or hue, and its intensity is weakened or lightened. Additions of black result in a shade of the color, and the intensity is saddened or made darker. Additions of white light have an effect somewhat similar to additions of white pigment, and exclusion of light results in a saddening or darkening, as though by additions of black. From these facts we conclude that the color of an inlay will be weakened or lightened by additional illumination; and if it be placed where the light will not fall directly upon it, the color will be darker. This teaches us that an inlay which is to be placed in a position where the light is unobstructed should be made slightly darker in tone than one which is to be placed in a less exposed position. Light transmitted through an inlay from the lingual to the labial surface

also has a tendency to raise the color in the scale of tone, as well as to increase the luminosity of the color.

The tone of the color of a porcelain body can be lowered—or, in other words, a darker shade of color can be produced—by the addition of black or of neutral gray. However, this would have a tendency to change the hue as well as the tone. A colored porcelain body, mixed with another body of a different color, will produce a porcelain not only changed in hue, but one of a darker shade. The darkening is caused by the absorption of additional rays of light, as each pigment selects for absorption certain colored rays and emits others. Additions of a white body to a colored body will weaken the color; it will result in a slight change in hue and a change in the scale of tone.

Cements and Their Modifying Influences on Inlays.—The modifications in the color of an inlay after it has been cemented to place have generally been attributed to the effect of the shadow of the cement. This is misleading, if we understand it to mean the ordinary conception of a shadow. It has been said that this shadow would not be present if we could obtain a transparent cement. When light passes through two media which differ in optical density it is refracted. If the cement absorbs a proportion of colored rays, complementary to those absorbed by the tooth and porcelain, a certain proportion of black will be formed; if the cement absorbs a portion of the light rays, there will be a decrease in luminosity; if the cement has the property of transmitting or reflecting considerable white light and colored rays which antagonize the effect of the porcelain colors there will be a consequent change in the color of the filling.

These are not all the changes which might take place because of the cement, but they are sufficient to demonstrate that the modifications in color are not all due to what is generally understood as "shadow." They also demonstrate the fact that a transparent cement would not necessarily solve the problem. We require a cement that will have the least influence in changing the light rays as they are transmitted through the tooth, and that will cause as little change as possible from reflected rays. It should be of an optical density between that of porcelain and of tooth-substance, so that the light rays might be transmitted with as little change as possible. It could be as opaque as the tooth and

yet not interfere with the final result any more than would the tooth itself.

A knowledge of the various modifications caused by the cement can be more easily learned by using as few cement colors as possible. Skill in overcoming the modifying influences of one color of cement is more quickly acquired than if many are used. Cements which differ in chemical constitution or in crystallization also differ in their optical effects. It is therefore easier to acquire a knowledge of these effects by using one variety of cement than by using many.

It is only through a knowledge of optics, especially in relation to light and color, that the porcelain worker will be enabled to solve perplexing color problems. A complete explanation of each phase of the subject of color and its relation to inlay work could not be given in a short treatise; the writer has therefore confined his remarks to a few of the fundamental questions.—*Dental Cosmos.*

ACIDOSIS, INDICANURIA, INTERNAL AND EXTERNAL SECRETIONS: THE EFFECTS UPON THE ALVEOLAR PROCESS AND TEETH. By Eugene S. Talbot, M.S., D.D.S., M.D., LL.D., Chicago. Research work upon diseases of the mouth, jaws and teeth from a local viewpoint has only partially solved the problems. Miller demonstrated that lactic acid ferment is the immediate local cause of tooth decay, but he did not consider the underlying factors, namely, the constitutional causes. The same is true of all other diseases, such as irregularities of the teeth, interstitial gingivitis, erosion and abrasion, sensitive dentin, diseases of the dental pulp, etc., because the fact was ignored that a constitutional element enters into all the pathology of these structures.

Advancing from the lowest vertebrate (the sea-squirt) through the different forms of life, from fish to reptile and from bird to mammal, including human embryogeny, the various phenomena encountered in the study of the pathology of the head, face, jaws and teeth can be accounted for.

In my studies of the pulp I demonstrated that scarcely one could be found without disease. Inflammation, abscesses, nerve-end degeneration, thrombosis, dilated vessels, arteriosclerosis,

endarteritis obliterans, pulp-stones, calcareous deposit, fatty degeneration, hyaline degeneration, fibrosis, and other diseases were found, sometimes followed by spontaneous death of the pulp. Discoloration of the teeth takes place with man's advance in years, oftentimes very quickly in disease; and, under certain conditions, also softening of tooth-structure and death of the fibrillæ. Decay of the teeth at the cervical margin is very serious in certain constitutional states, as well as softening or discoloration, or both, of dentin under moisture-tight fillings, while sensitive dentin is very troublesome at times. Teeth grow harder as age advances, but when pathologic changes in the internal secretions occur, the teeth gradually grow softer. I also demonstrated that the pulp and the alveolar process are doubly transitory structures, therefore more liable to disease and the first to be involved in constitutional disorders. In pulp-evolution the tissue is healthiest and at its best when it begins to form dentin. As the dentin is formed the pulp degenerates, and, like the covering of the chrysalis, after it has performed its mission in life, it becomes useless. The pulp, then, as well as the alveolar process, is an easy prey for disease.

Many theories have been advanced for these various lesions, and oftentimes one theory which seems tenable in a given case must be discarded and another must be proposed for the same condition in other mouths. Again, a cause advanced for one lesion is seldom satisfactory for other lesions even in the same mouth.

A scientific law based on a given hypothesis and to be accepted as correct must not only explain all the facts, but must exclude all other explanations. Working upon such an hypothesis, it is my intention to present a theory that may be applied to all the lesions previously mentioned. In my paper on "Acid Autointoxication and Systemic Diseases the Cause of Erosion and Abrasion," I demonstrated that under certain conditions of the system there is an abundance of indican, excessive urinary acidity and excessive acidity of the stomach. The causes bringing about acidosis are: Excessive eating, and drinking of stimulants; all forms of nerve lesions, producing nervous dyspepsia; fruits, acids of all kinds, diseased and tired eliminating organs, and a lowered vitality. Many cases have also been recorded where grief, mental worry, nervous breakdown from overwork, neurasthenia,

paretic dementia, tabes, ataxia, lesions of the heart, artery and kidney, are associated with rapid decay of the teeth, with interstitial gingivitis, pulp-degeneration, softening of tooth-structure, decay of the cervical margin, sensitive dentin, and with a red, swollen and fissured tongue. In these conditions there is always a marked interstitial gingivitis, occasionally pyorrhea alveolaris, while in disease, and especially in lues, rapid softening, discoloration, and destruction of tooth-structure take place. A marked illustration of this condition is found in the case of a forty-three-year-old man, weighing 250 pounds, who had lues for five years. While the deep-seated glands of the groin alone were involved, and a slight rash on the arms and back was present, supposed to be due to poisoning from a colored shirt which the patient had worn three years previously, nothing of any consequence was noticeable except a destruction of the alveolar process, beginning at the third molar on both sides of the upper jaw. The patient had well-developed jaws and teeth; no cavities were present. The teeth occluded squarely and were very much worn. It was a marked case of erosion. The teeth were discolored. Interstitial gingivitis had caused destruction of the alveolar process to the extent that two molars on the right side and one on the left were lost. The other molars were beginning to loosen. The effects of the internal secretions were especially demonstrable upon the alveolar process and teeth. This patient's case baffled the skill of five physicians, and he had received no specific treatment. The degree of urinary acidity was 70.

Continued acidosis, intestinal fermentation causing indicanuria, heart and artery changes, as well as kidney lesions, produce autointoxication. In acidosis, intestinal fermentation and autointoxication there is a deficiency of alkalinity of the blood. In all diseases of faulty metabolism of the system, in pregnancy, etc., there is nearly always an abnormal degree of urinary acidity. The degree varies, not with age, but with the severity of the systemic changes. I have never tested the urine of so-called acid babies; but in children of four years of age suffering with bronchitis I have found the degree of urinary acidity to be as high as 108. In a fifty-five-year-old woman suffering with severe rectal pain the degree of urinary acidity was 114. Luetics have the highest de-

gree of urinary acidity, varying from 64 to 146. It is more often over than under 100 degrees.

Acidosis frequently is a family characteristic, hence it constitutes the reason why certain diseases like interstitial gingivitis, decay of the teeth, erosion, abrasion, tooth-discoloration, sensitive dentin, pulp-diseases, pulp-destruction, tooth-softening, gout, rheumatism, arteriosclerosis, kidney lesions, various forms of neurasthenia, etc., are associated with one another, and are supposed to be inherited.

Indicanuria is a manifestation of a blue coloring substance in the urine. It is derived from indol, which forms indican. It is supposed to be due to three sources; first, to intestinal fermentation and putrefaction of nitrogenous substances; second, to suppuration in some part of the body; and third, to the formation of indol in the cells of the body tissues. The fact that indican is found in the urine is a sufficient indication that this poison has circulated in the blood throughout the entire system and has been returned to the kidneys to be expelled. I have demonstrated many times that indicanuria and neurasthenia are in some way related. Reducing the intestinal fermentation and putrefaction by the use of intestinal antiseptics, the neurasthenic condition of the patient is often relieved. The toxic effect of acidosis and indican upon local tissues, especially upon terminal and transitory organs, is very marked. Their injurious effects consist of irritation in the blood vessels. The salivary glands, the mucous glands, the alveolar process and the dental pulp are the first structures to become involved.

Indicanuria is one of the great sources of autointoxication. The toxins of indican permeate all the structures of the body, being carried by the blood circulation. While acidosis and indicanuria may go hand-in-hand, the quantity of indican depends to a certain extent upon the acidosis relative to the amount formed in the intestines. Thus, upon reducing a high degree of urinary acidity to normal or below, the indican will be increased, owing to the abnormal bacterial activity in producing putrefaction. These germs seem to thrive better in alkaline than in acid media. An accumulation of indican in the system will often cause febrile disturbances, lassitude and gastro-intestinal irritation—depending, of course, upon the severity of the attack. The effect of indican is

not unlike that of poisonous drugs, such as mercury, lead, phosphorus, bromid, quinin, etc., which produce poisonous symptoms in some individuals. In others there are apparently no ill effects. It must, therefore, not be overlooked that in all persons with persistent indicanuria the poison is continuously absorbed from the intestines into the circulation for months and years, and that in many persons it will not manifest itself until the periods of stress at forty-five and again at sixty years of age. Metchnikoff, in considering the phenomena of old age, concludes that autointoxication due to intestinal putrefaction is one of the most important causes of premature senility, in that it causes arteriosclerosis. The accumulation of these toxins in terminal organs, such as the pulp and alveolar process, is as disastrous as the accumulation of any of the poisonous drugs. Arteriosclerosis is one of the common diseases found in the alveolar process and in the pulp, which is a positive proof of its systemic origin.

The research work on urinalysis in cases in which pathologic conditions of the mouth were present was begun in March, 1901, and has been continued to the present time. During that time, 287 urinalyses were made. All these cases showed acid mucus; in some, acid saliva and interstitial gingivitis; in many, erosion and abrasion were present. All of these patients and some who did not have erosion and abrasion possessed soft teeth. In many cases, the cervical margins of the teeth were sensitive. Those in which interstitial gingivitis had progressed so far that the teeth were removed and the pulp was examined were found to be pathologic.

The first 50 cases were reported in my article on "Interstitial Gingivitis Due to Autointoxication as Indicated by the Urine and Blood Pressure Diagnosis;" 129 cases were reported in my article on "Acid Intoxication or Acidosis a Factor in Disease," and on the last 108 cases I have now to report:

The degree of acidity showed in three cases 10 degrees, two 11, one 13, one 14, two 15, four 16, four 17, two 18, three 20, three 21, five 23, three 24, five 25, one 26, one 27, one 28, four 30, two 31, two 32, three 34, two 35, three 37, seven 40, one 41, one 46, two 48, one 49, three 50, one 51, one 52, two 53, one 55, one 56, two 58, one 59, one 60, three 62, two 63, one 64, one 66, two 70, one 74, four 75, one 76, one 78, one 79, one 80, one 83, one 84, one 100, one 104, one 105, one 108, one 110, one 113; two alkaline.

Indican was present in 53, a trace of indican in 18, none in 36, and no observation was taken in 21. The normal degree of urinary acidity is from 30 to 40.

For a number of years I have made observations, and I have reported cases of interstitial gingivitis, erosion, abrasion, discoloration, and softening of tooth-structure among tabetics and paretic dements. Urinalysis was made in thirty-five tabetics and twenty-five paretic dements. All the paretic dements showed urinary acidity, while only four tabetics were alkaline. The alkalinity was due to cystitis. All showed indican in a greater or smaller degree. The fact that the urine was normal at the time of the examination is no proof that it was not acid and did not contain indican four weeks before, or that it would not be excessively acid with an abundance of indican four weeks later. I have demonstrated this variation many times. The condition of the excretions of the body depends upon the habits and the mode of living of each individual, and these change constantly. A long-continued acidity of the urine and an accumulation of indican in the system soon produce marked impressions upon the jaws and teeth.

The method of obtaining the degree of acidity of the urine, as given by Neubauer and Vogel, is very simple. The instruments necessary are one burrette 50 ccm., one wooden stand, one Barnes' dropping-bottle, one 10 ccm. graduate and one small glass. Place the burette in the wooden stand in an upright position; fill the tube with the solution (decinormal sodium hydrate) to exactly 0. The degree of acidity is obtained by taking 10 ccm. of the urine specimen measured in the graduate glass, and pouring it into the small glass; add four drops of phenol-phthalein; then add drop by drop NaOH (decinormal sodium hydrate) until a slight pinkish color is produced. Having noted on paper the number of ccm. of the NaOH in the burette before and after the pink color is obtained, the number of ccm. displaced multiplied by 10 (in order to find the number of ccm. of NaOH necessary to reduce 100 ccm. of urine) equals the degree of acidity. Each step in this operation must be carefully performed, and each instrument must be kept perfectly clean, in order to get good results.

The normal degree of acidity of the urine is from 30 to 40. When the degree is below 30 (the difference between the degree indicated and 30 shows the degree retained in the system), it indi-

cates either renal insufficiency or excessive suboxidation, producing renal strain. In cases in which the degree of acidity exceeds 40 there is excessively imperfect oxidation, which, irrespective of the types of acid, underlies, as is now almost generally recognized, severe constitutional stress allied to that of diabetic acidosis.

The question arises, Does the quantity of urine passed in twenty-four hours influence the degree of acidity? Thus, if more than forty-eight ounces, *i. e.*, the normal amount, were passed, the degree of acidity would be low as compared with less than forty-eight ounces. There is a relationship between the polyuria produced by nerve and other strains in seemingly normal persons. This occurs in students taking examinations, and in certain hysterics under excitement. The eliminatory functions of the kidneys are interfered with, but the watery excretory powers are increased. There is real, albeit not nosologic, renal insufficiency, producing a condition temporarily analogous to diabetes insipidus. The state is not normal, but is not necessarily nosologic.

On application of the phenol-phthalein, if the urine specimen turns pink, it is alkaline, therefore no degree of acidity can be obtained.

To obtain the amount of indican in a given specimen, take five ccm. of urine; pour it into a test tube; add five ccm. of hydrochloric acid, and shake thoroughly. Let the mixture stand for a few moments. Add ten drops of hydrogen dioxid, shake thoroughly, and let it stand for a few moments; then add one ccm. of chloroform, shake thoroughly again, and let it stand. If indican be present, chloroform will absorb it, turn blue, and settle to the bottom of the tube; if there be no indican the chloroform will remain white.

The toxins in the blood which are the result of acidosis and indicanuria are carried to all structures of the body. All structures of the body, however, are not alike. Some, especially those that are active and are needed for the welfare of the body, under the law of economy of growth or use and disuse of structures, can take care of the toxins and return the blood to be cleansed of its impurities. Other structures which are of little use, and are called terminal organs and transitory structures, such as the dental pulp and the alveolar process, cannot dispose of the blood so readily. The result of this is an accumulation of toxins, and disease fol-

lows. Other terminal organs that can stand the strain a little better, but are sure to succumb later, if the toxins continue to be present in the blood, are the kidneys, the heart, the liver, the eye and the brain.

One object of this paper is to bring before the profession the fact that early symptoms of systemic disorders may be recognized, and prophylactic means may be adopted to ward off future trouble. Heart pressure, endarteritis obliterans, arteriosclerosis and dilated arteries are easily demonstrable in the pulp and in the alveolar process by early symptoms of acidosis and indicanuria. It will be seen, then, that acidosis and indicanuria are factors which cannot be overlooked.

To ascertain the blood pressure in those of my patients that suffer with interstitial gingivitis, I used Cook's modification of the Riva Rocci sphygmomanometer, this instrument being exceedingly simple and best adapted for my convenience. The armlet used was sold with the instrument and consists of a rubber bag 4½ by 40 ccm. The patients ranged from twenty-seven to sixty-seven years of age. With this instrument the normal adult female arterial blood pressure is 115 to 125 mm. Hg.; adult male, 125 to 135 mm. Hg.

Among twenty-six females, there were three who ranged between 115 mm. Hg. and 125 mm. Hg., and were therefore normal. Three ranged below 115 mm. Hg., and twenty from 135 mm. Hg. to 180 mm. Hg.

Among twenty-four males, there were eight who ranged between 125 mm. Hg. and 135 mm. Hg., and were therefore normal. Three ranged below 125 mm. Hg., and thirteen from 135 mm. Hg. to 160 mm. Hg.

When we consider that thirteen of these patients were under forty-five years of age, the high blood pressure is remarkable.

It is needless for me to enter into a discussion of interstitial gingivitis at this time, since I have covered this subject in my last three or four papers. I will say, however, in regard to this disease that the toxins in the blood irritate the tortuous blood vessels running through the alveolar process, and because it is an end-organ and a transitory structure, a low form of inflammation is set up, and absorption takes place. When there is an excessive urinary acidity and indican, the mucous glands of mouth and

vagina and the sweat glands of the skin secrete an acid fluid. If the urinary acidity and indican persist, the salivary glands will secrete an acid saliva. The blood has a diminished alkalinity. The more persistent and prolonged the urinary acidity, the less the alkalinity of the blood and the greater the acidity of the mucus, saliva and sweat.

Before proceeding farther with our pathologic research, let us consider briefly the changes which the tooth and the tooth-pulp undergo on account of the toxins in the blood. The pulp is a degenerate organ. It has degenerated in its evolution from the lower vertebrates. It also degenerates in forming dentin. It is at its best when it begins to form dentin. The blood enters the pulp through a small opening by way of a small artery and escapes by a small vein. It is, therefore, like the alveolar process, not only an end-organ, but markedly transitory. It is virtually a ductless gland. What is the nature of ductless glands? All ductless glands are secretory. The pulp, in all probability, like other organs has internal secretions. Other ductless glands are the liver, which has two functions, first, that of excreting or destroying poison; second, that of blood-making. The poison destroyer has a duct, the other has not. The testes and ovaries each have two functions, first, a reproductive one; second, a secretory one for the nourishment of the body. To use a better illustration, the bone marrow, which roughly corresponds to the pulp, has a blood-making function of producing bone cells, but it has no duct; its product returns to the circulation. All are familiar with the action of the other ductless glands. The pulp is a most marked example of an end-organ without a duct, but its product, under the general law of ductless organs, must pass into the general circulation by absorption in the blood vessels. The pulp secretes or excretes toxins from the blood, which pass through the fibrillæ and destroy them, soften the tooth partially or the dentin and enamel entirely, and destroy the cement substance between the enamel rods.

In some cases of systemic changes due to disease and acidosis, teeth will suddenly discolor and pulps die without decay or external action. Not infrequently, pulps will die one after the other in teeth in one mouth without apparent cause. In other teeth, pulps die no matter how well or how carefully the teeth may be

filled. Changes in color and density, and pulp-disease frequently occur in people over thirty-five years of age without decay. Acidosis and indicanuria are more frequently observed after that period, partly due to the tired-out eliminating organs.

The question arises, How do we know that toxins are excreted by the pulp? I have demonstrated this in four cases. In the past ten years I have cracked open more than six thousand teeth. The pulps were tested for acid by litmus placed on paper and upon plaster disks in the manner described by me in other papers. While the litmus test is crude and uncertain, I have had a number of good results. The plaster-of-Paris method is more successful. In all cases the specimen was examined with a magnifying glass. Not a large percentage of cases was discovered—and it could hardly be expected. It would be very difficult to obtain many teeth from favorable people with acidosis. The fact, however, that such conditions are present, and that acid pulps are found by such crude methods, is sufficient to account for the changes taking place in pulp, fibrillæ, dentin and enamel.

Sajous says: "The axis cylinders of all nerves and the dendrites of neurons are found to contain a fluid identical with the blood plasma in its reaction to staining fluids. Even the neuroglia fibrils asserted their identity as plasma-capillaries, the neuroglia fretwork of two substances of the brain and cord representing the intrinsic circulation of these organs. The muscular contractile structures, the various glandular organs, including the liver, pancreas and spleen, the gastric and intestinal glandular elements, etc., were all found to be so disposed as to allow the free circulation of this oxidizing plasma, the red corpuscles passing on in the larger channels."

It will be seen, therefore, that toxins and acid conditions may circulate freely from the pulp through the tooth-substance by way of the fibrillæ and decalcify tooth-structure. The decalcification may be only slight and the fibrillæ may lose only part of their sensitiveness. The pulp may partially lose its sensitiveness on account of nerve degeneration. This tissue is frequently removed without pain and without the application of drugs. On the other hand, decalcification of the teeth has been observed by all dentists to the extent that the calcium salts have been entirely removed in a few months. The remaining sub-

stance could be scraped off like horn. Again, it has been observed that the crowns of teeth have decalcified so that nothing remained except the clean roots protruding through the gums.

The degree of decalcification and the rapidity with which it is performed will depend entirely upon the cause of the toxins in the blood and upon the severity of the disease which produces them. The simpler forms of toxins and changes in structure in the mouth are those in which the individual gradually grows old without disease. The eliminating organs become tired, the result of which is that a certain amount of toxins is retained in the blood. Excesses in eating, or drinking stimulants, or both, are fruitful sources of acidosis and indicanuria. If the kidneys do not become involved, the individual will survive until the senile period of stress—at about sixty—when heart failure or apoplexy results, owing to decay of the arteries. All the diseases of the jaws and teeth will have been experienced. Frequently the kidney, liver and other organs of the body become involved during this flight from youth to middle age. The most rapid degree of decalcification of the teeth takes place in lues, where the highest degree of urinary acidity and the largest quantity of indican are to be found. In such cases, I have seen comparatively healthy teeth in young men decalcify, with cavities in nearly all the teeth; the destruction of the alveolar process takes place in six to nine months' time. The extent of decalcification, of destruction of the fibrillæ, and of pulp lesions, depends upon the severity of the toxins in the blood. The teeth, having lost their power of resistance, may easily take on decay, erosion and abrasion. The destruction of the fibrillæ already has caused discoloration.

Having shown the effects of internal secretions due to acidosis and indicanuria upon the structures of the jaws and teeth, we will now study the effects of external secretions, due to the same causes, upon the teeth. We showed that the degree of acidity of the mucus and saliva, which are external secretions, depends upon the degree of toxins or upon the diminished alkalinity of the blood. Friction of a foreign substance, like a toothbrush, of the lower teeth against the upper, of the lips or tongue, will cause wearing away of the softened tooth-structure without the aid of acids. The latter, however, greatly assist in this operation. The acid mucus collects upon the teeth, and, with the aid of friction, quickly de-

stroys tooth-structure. When the saliva becomes acid, teeth which have lost their resistance easily become affected by erosion and abrasion. Tooth-softening permits any or all of the acids in the mouth, including lactic acid, to act upon tooth-structure and to cause disintegration. The acid external secretions, dripping upon the surface of the softened teeth, will cause disintegration without friction. A further discussion on erosion and abrasion will be taken up in my next paper.

The subject of tooth-decay is such a vast one that only a few obscure points will be considered in this paper. At the meeting of the International Dental Congress at St. Louis, I asked an explanation of the following case from Dr. Miller, in discussing his paper: A girl of thirteen years had her teeth put in thorough order before going to a preparatory school. Upon her return at the end of the school year there was decay about the fillings, and also many new cavities had developed. Dr. Miller's reply was that the young lady had been eating chocolates. This hardly explains the condition. If she had been eating chocolates—which she had not—she might have brushed her teeth after eating them and thus have removed the local condition. Experience has taught me that close confinement in school, hard study, monotony in diet, ambition to excel, homesickness, want of fresh air, of sunshine, and of exercise, worry and nerve strain from examinations, produce acidosis and indicanuria, which in turn cause changes in the internal and external secretions, which reduce the resisting power of the teeth, thus causing their rapid decay. Every dentist has had such an experience. Teeth decay rapidly during pregnancy as well as in disease. Teeth frequently decay very rapidly in senile periods, when they are supposed to be the hardest, and when little or no decay had occurred previously. Teeth have decayed and the enamel has become very brittle while an abscess was forming and discharging from the pelvic cavity. Teeth frequently decay rapidly and the alveolar process becomes absorbed in patients suffering from grief, worry and overwork. I have recorded a number of such cases. There is a vast difference between the processes of decay of the teeth as observed in the skulls of the most ancient races, such as the lake-dwellers, the cliff-dwellers, the mound-builders, and those of the teeth which you and I are treating today. There is a vast difference between the decay of the teeth of

the negro races in the North and similar pathologic processes in those who trace their ancestry in this country back for 250 years. There is a great difference between the decay of the teeth of those living in the Northwest and the decay occurring in the inhabitants of England, Ireland, Scotland, Wales, and here in New England and its vicinity. These differences are due to evolution and degeneration. Environment is next in importance, including degeneration. These changes in tooth-structure due to systemic changes must be studied and understood before we undertake to apply local theories.

You all have seen decay of the cervical margin take place rapidly in the mouths of some of your patients who scarcely ever masticated their food, as well as decay in the mouths of sick, anemic and poorly nourished children. The results of this are toxins in the blood, causing the mucous and salivary glands to discharge acid secretions, which, in turn, unite with the decomposing food accumulating about the necks of the teeth. The teeth have lost their resistance from internal toxins acting through the pulp. Sensitive dentin can also be accounted for in a majority of cases as being due to an acid condition of the mucus and the saliva influenced by systemic changes.

Dr. Elliott P. Joslin, of the Harvard Medical School, in his researches and writings has added many data to the subject of acidosis, especially in relation to diseases of such end-organs as the kidney, liver, brain, etc. His studies have been conducted upon animals and human beings in diseases such as diabetes, coma, etc. He says, "The reaction of the blood in diabetes confirms the view of an acid poison." The worst forms of tooth-softening, discoloration, erosion, abrasion and interstitial gingivitis are found in connection with these diseases. These diseases, however, are far advanced in end-organs, such as the dental pulp and the alveolar process, long before they are manifested in end-organs in other parts of the body. This is another illustration of the fact brought out by me in other papers, that acidosis and indicanuria are the principal causes of diseases of the alveolar process and of the teeth, and it confirms a statement which I have frequently made, namely, that the educated dentist, by observing symptoms in the mouth, is able to warn his patient of the approaching storm, while the physician rarely sees the patient until the storm has broken. A

reduction of acidosis and indicanuria—two of the visible signs of toxins in the blood—and a preservation of normal conditions, will overcome many of the pathologic conditions found in the mouth.

This newer and broader pathology, which recognizes the constitutional causes of diseases of the mouth, opens up a new vista on the horizon of successful dental practice—*Dental Cosmos.*

CEMENTS—THEIR APPLICATION. By B. D. Rivers, D.D.S., Louisville, Ky. With all its weakness, cement has played a most conspicuous part in the restoration and preservation of teeth in the past; yet its future possibilities have scarcely been hinted at by its past services. It has occupied a place in the hands of the dental practitioner that has rendered it well-nigh indispensable; its possibilities and adaptation are such that, should it be suddenly eliminated, the wheels of progress would cease to turn and every operator would pause in bewilderment until a substitute could be provided.

Cement was introduced to the profession about a half century ago, zinc oxychlorid being the first form in which it was used; but it was soon determined to be a complete failure as a filling material because of its extreme solubility in the mouth and its undergoing considerable contraction in settling.

Zinc oxyphosphate was the next form in which it was used; and while it was then very imperfect, in the hands of enterprising manufacturers it has undergone many and great improvements, and today we have in the best makes a material to be depended upon when properly handled and used. It is formed by the mixing of zinc oxid with some of the various forms of phosphoric acid, the care in selecting and preparing and the purity of the product determining the degree of excellence in cement.

Dr. Ames, one of the most thorough investigators along these lines, tells us that if the product contains more moisture than necessary to furnish the water of crystallization we have a mixture that shrinks on setting if it forms a nonporous mass; while if the surrounding tissues are depended upon to furnish part of the water of crystallization slight expansion may be expected. For this reason he condemns extreme dryness of the tooth when using.

With reference to mixing, Dr. Ames further states that if the

powder is added rapidly with little spatulation we get a rapid-setting product with slight shrinkage; if, on the contrary, there is a slower addition of powder with more thorough spatulation, we get more proper working qualities with perhaps slight expansion; while if the powder is added to the liquid in very small quantities and mixing extended over a long period we get a product that will never properly set. It is not, however, my purpose to go into the details concerning the composition and manipulation of this material with the view of determining the effects to be had in the product itself, however inviting and profitable that field might prove.

I would prefer at this juncture that you go with me in the consideration of zinc oxyphosphate in its application to the restoration and preservation of tooth structure. There is no material used in dentistry that is more compatible with tooth structure than zinc oxyphosphate. Its constituents, conductivity and density seem to be about right. Its perfect adaptability is admirable; its color is harmonious; its resistance to pressure is good; and its adhesiveness renders it indispensable. It possesses properties that arrest the progress of caries in its presence. We never see recurrence of decay as long as there is a vestige of cement in a cavity. Its solubility in the presence of the oral secretions renders it a failure as a filling material to be used alone, where any degree of permanency is desired.

In view of these facts, then, it seems to me that the ideal application of this material as an agent for filling teeth is to combine it with other materials in such a way that its good qualities can be taken advantage of and at the same time be protected from the oral secretions. I believe in every case where a metal filling is to be used, and the cavity is large enough to justify it, there should be a cement lining. It has been suggested by a most splendid operator that cavities filled without cement are like a brick house built without mortar. The color of the tooth is thus maintained and the adaptation is perfect, besides giving a more normal conductivity.

My favorite way of combining with alloy is to line the cavity with cement of the consistency used in setting the crown, and while soft pack alloy in the cavity, first at gingival, being careful to guard the margins and freeing them from any excess of ce-

ment that may be squeezed out. By this method you gain time and get a more perfect adaptation and more uniform filling throughout; besides, the complete adhesive property of the cement is made use of.

A most splendid way that these two materials can be combined is to mix each ready for the filling, then mix them together and insert, after which veneer with alloy. This is especially advantageous in badly broken-down and inaccessible teeth where the adhesive property of the cement is to be depended upon.

The most beautiful and beneficent combination is that of cement with gold in all classes of fillings. From the very nature of things it is very difficult to gain adaptation between two materials as different in structure as tooth substance and gold; especially is this true with cohesive gold, and many failures in gold fillings are due to this very difficulty, discoloration of tooth structure and recurrence of decay being some of the evidences. By forming a cement lining the oxyphosphate in crystallizing forces itself into every minute irregularity of cavity wall and is knitted to the tooth itself, thus not only giving perfect adaptation, but its adhesiveness adds to the retention.

The method employed in this combination is to prepare the cavity as usual, cover the walls with cement, then take a piece of gold about the size of the cavity usually, and gently press into place, being careful to press the gold well into retentions. The next piece of gold will cover up all the excess cement that may have forced through; at the same time you should be careful to keep the margins clean. After the first few pieces of gold have been used as much force as desired may be employed. I find a number of makes of gold well adapted to this purpose, such as Keeton-Williams and moss fiber; but I have gained results with less waste from Watt's crystal strips. After the filling has been started and all the cement covered, any form of gold may be used to finish with.

With this combination you save time; you insert a filling that will never loosen and in which thermal changes are not so evident. In teeth with thin labial walls it is most admirable, as you get adaptation with diminished force and at the same time give the tooth its natural color, with the added support that the cement furnishes. Time fails me to more than mention copper oxyphos-

phate cement, which sets very rapidly on the application of heat. It is extremely hard, and is especially adapted to use in children's teeth, as an ordinary amount of moisture does not destroy its effectiveness.

It remains for me to speak yet of another form of cement that is full of promise along the lines of beauty and utility. I refer to what is known as the silicate cements, termed very aptly by some as chemical porcelain. It is furnished to us under various titles, as Ascher's Artificial Enamel, Translux, Beryllite, Harvard, etc. The material is made up chiefly of the aluminum, calcium silicate and magnesium, and modified by some of the rare earths. The powder of Ascher's Artificial Enamel contains 54 per cent of aluminum, calcium silicate and magnesium, and about 20 per cent of beryllium. They claim that it is the last-named ingredient that gives it its excellent qualities and upon the use of which they have a patent. In the place of beryllium the Translux manufacturers use the thorium silicate, a salt of a metal belonging to the same group, claiming that it insures a more translucent effect, greater density, and is less soluble than beryllium. Of course, the ingredients and proportions differ to conform to the individual formulas of the various manufacturers. The liquid used seems to be very similar to that used in zinc oxyphosphate.

Silicate cement in its present form is a new product; yet something like twenty-eight years ago William H. Rollins of Boston obtained a patent on a silicate cement which contained most of the essential elements of the silicates of today. This product was, of course, a failure, but served to point the way; and industrious investigators have been at work both in America and Europe, and as a result there are on the market a number of products that are really full of great promise and have stood most satisfactorily the tests applied to them.

The ideal filling material, when it is found, will be one of plasticity, assuring ease of manipulation and adaptation, harmonizing with tooth structure in color and translucency, resistant to the application of force, and insoluble in the oral environments. While the silicate cement does not possess all these qualities, a number are most strikingly present. Its color is esthetic, manipulation and adaptation are easy, and when properly worked is insoluble, thus making it a permanent material when inserted in proper localities.

Its friableness precludes its being used in the restoration of bold contours, though tests have shown it to be much more resistant than the best zinc oxyphosphate; but in labial and buccal cavities and in approximal surfaces of anterior teeth, where the angles are not involved, it is almost ideal.

For its use the cavity should be prepared with undercuts as in gold, as it does not possess any adhesiveness. The margins should always be prepared so as to avoid as much as possible a thin overlapping portion of the material to prevent chipping.

In its manipulation perfectly clean nonmetallic instruments should be used—bone or agate spatulas and pluggers—otherwise the color may easily be changed and the formula modified, as its granular consistency would readily wear away the metal instrument, as well as its being attacked by the acid. In mixing we cannot do better than follow closely the directions given by the manufacturers, as they have arrived at their conclusion by long and persistent experimenting. Spatulate thoroughly and work to a stiff paste, though we should not attempt to work it too stiff.

The rubber dam should always be adjusted for its insertion, as the least moisture is not compatible with success. Dry the cavity thoroughly with alcohol and hot air, pack the material into the cavity with as much force and dispatch as possible, and then draw around it a celluloid strip lightly coated with vaseline, holding tight and burnishing on the outside of the strip. When the excess has been burnished out at the margins, raise up the strip, trim off, and burnish again. This pressure is important, as it avoids the shrinkage in the filling complained of by some.

If the filling is too full after setting, it can be polished with fine cuttlefish disks or strips touched up with a little vaseline. By continuing with the strip until all the grit is gone, or covering it with the silicate powder and polishing, a very beautiful finish can be given. The filling should be kept absolutely dry from fifteen to thirty minutes. The practice of some is to keep the rubber on fifteen minutes, and then coat with paraffin wax, which will protect it sufficiently long.

I believe we have in this material a beautiful substitute for gold in many instances, insuring for the patient more happy and more esthetic results, and for the operator a more attractive and less laborious operation; and let us hope that investigation will

continue its unceasing search until the defects now noted are eliminated and we stand the proud possessors and users of the long-coveted and persistently sought-for prize—the ideal filling material.—*Dental Headlight.*

ORAL PROPHYLAXIS. By Grace P. Rogers, D.D.S., Detroit, Mich. To describe the details of any mechanical performance or treatment in an interesting way is most difficult, and to the listener the description is apt to prove very tiresome. In order, then, not to tax anyone's patience too greatly, the writer wishes to be brief and trusts that the reader will be sufficiently interested in the subject to overlook any lack of interest in this article, and since this is being written only for beginners in this new field of dentistry, she does not desire the "higher criticism."

The scope of oral prophylaxis is a broad one and properly includes the study, diagnosis and treatment of any unhealthy mouth condition which mechanical dentistry cannot relieve. However, if one can successfully treat pyorrhea in its different stages, and prevent for his patients the larger per cent of caries, then he can be trusted to cope with other conditions which he is liable to meet. For the sake of brevity, then, we will consider only the technic of the treatment necessary to relieve conditions which constitute the bulk of our practice in oral prophylaxis, such as inflamed gum tissue, including pyorrhea in any of its curable stages, as well as the slightest irritation of the gum margin.

The object of treatments given in an unhealthy mouth is to place that mouth in a state of health. In order to do so one must of course remove the cause, be what it may. It is not necessary to discuss a case where poor dentistry is responsible for the inflammation, since all good dentists would know the best remedy. But let us consider a case where foreign substances of a pathologic or chemic nature are the irritants. These may be tartar (serumal or salivary), bacterial deposits, dead tissue, soft accumulations, and oftentimes a roughened enamel surface.

A person who works at anything without an aim seldom accomplishes much in that line. So we in oral prophylaxis should have an aim, an ideal toward which to work. Let it be in every case a mouth in perfect health, which is a joy and comfort to the pos-

sessor, and one which exhibits the least possible amount of patchwork. We should not consider the work complete until we have also educated our patients to the highest ideals in dentistry and to a keen sense of appreciation of oral hygiene and value of their teeth. We have an unusual opportunity to educate our patients to the best there is in dentistry, and if they do not respect us and our profession it is our own fault or that of some other dentist. If we would spend as much time holding up the dignity of our profession as physicians spend on theirs, there would be no question as to our position among the professions. Any person who is not proud to be a dentist has no right to the D.D.S. degree, while those who are proud of that degree should hold their heads sufficiently high to attract attention.

To consider the details of our part of the work: First of all the patient must be shown the exact condition of his mouth, including inflamed or hypertrophied gum tissue, stains, visible deposit, and the invisible coatings by staining the latter with iodin. Then he will appreciate the task you have before you, and the necessity of his improving the personal care of his mouth. Tell him that this condition has not all taken place in a week or a month, but is probably due to years of neglect (as it is in most cases), and that he cannot expect one or two treatments and a few days of time to effect a cure. Do not, above all things else, begin your work and keep plugging away with no word of explanation, for in that case the difficulty of your work will not be understood and your efforts will not be appreciated. First of all obtain your patient's interest, and soon you will get him enthusiastic, and then your road is clear. All this is essential because this work is new to everyone and they do not understand that your aim is any different from the dentist who "cleans teeth" simply to get them clean. They do not realize that you have in mind a healthy, comfortable mouth for them, preservation of their teeth through life, prevention of much caries, and in many instances relief and prevention of systemic disturbances, to say nothing of the esthetic result.

For the removal of tartar and roughened enamel margins, one must have efficient scalers and files. For the heavy deposits, one must use strong scalers, but the largest and most difficult part

of our work is with the small deposits and under the gum. For this we must have delicate instruments, of a sufficient variety of shapes so as to enable us to work in any position with the least possible laceration of gum tissue. The writer has found the set of Carr instruments to be ideal for work under the gum margin. However, there are many other good instruments which if used intelligently will accomplish wonders. The Smith & Ferris-Tompkin files are indispensable to anyone, no matter what is contained in his collection of scalers. For the heavy work the Darby-Perry scaler No. 9, and its modifications by Dr. Jungman, as well as the D-P No. 11, and its modifications by Dr. Meerhoff, are most valuable.

One must learn to steady his hand while scaling and polishing, and especially is this necessary when working under the gums. Usually one can use the teeth for the fulcrum, but sometimes this is impossible, owing to their absence in some locations, or to the fact that they are too unsteady, in which case one can use a finger of the left hand to advantage by placing it against the process wherever needed.

Do not use an anesthetic unless absolutely necessary, which will be but seldom. If the proper instruments are used and the work carefully done, but little pain is caused, unless, of course, the teeth are sensitive at the necks. This latter condition is usually overcome by adding a very small amount of sodium bicarbonate to the tooth powder, and by recommending a weak solution of it, used hot, for a mouth wash for a week or ten days after the first general treatment.

If a patient is suffering when he first comes to you, of course you must needs relieve him, but at the first appointment remove all visible accumulations and take the time at this sitting to carefully instruct him in the care of his mouth. Show him what you have done and that his teeth are free from visible accumulations, and impress upon his mind the fact that he will be responsible for keeping them that way. Be sure that he has, or will procure, the proper toothbrushes and floss. Give him the kind of powder his case requires, and an astringent mouth wash to use until you see him again (providing, of course, that his teeth are not sensitive, in which case he would require the sodium bicarbonate solution).

Just here let me enter a plea for recommending an astringent

mouth wash during the healing process. It will help materially and no one can afford to get along without this aid.

There are many good reasons for this general treatment of the whole mouth at the first sitting, rather than to take one section of the mouth at a time. First—The gums respond very quickly to this form of treatment and will soon be comfortable enough for the patient to brush and massage them, thus stimulating the circulation and so aiding the healing process as you continue your work. Second—Hemorrhage will be less during the operations under the gums if the mouth has been first treated in this way, for the inflammation of the gum tissue will have subsided considerably, and there will be less cause for hemorrhage. Therefore, and for other reasons, the operator will have an agreeable field in which to operate. Third—Another important reason for this method of procedure is that the patient's ability and willingness to follow your instructions regarding the personal care of his mouth will have a fair test, for you see his mouth from time to time while scaling the roots, which gives you an opportunity to encourage, criticise or instruct, as the case demands. Fourth—The patient is better satisfied, for he can see and feel the improvement and is naturally more agreeable and willing to help. Fifth—If there is a tendency for salivary calculus to deposit, by a few minutes' work you can remove the little granules, call your patient's attention to those surfaces in particular, and thus give him a fresh start. As often as once in two weeks, in most cases during treatment, it is necessary to carefully polish by hand methods the exposed tooth surfaces. This is a great aid, for it smooths the enamel surfaces which have been roughened by years of exposure to stains and acid accumulations, and at the same time stimulates the tissues. For the benefit of those who condemn the hand method of polishing, the author would say that just as soon as you use the engine for this work, you lose sight of its foundation principle, its aim and its excuse for being, which is the health and comfort of the mouth and the preservation of the teeth through life. The dentist who uses the engine does so to clean the teeth, and thinks that we use the orange wood and floss for the same purpose. We use the orange wood and floss on every exposed tooth surface to massage and stimulate tooth pulp, pericemental membrane and gum tissue, as well as to re-

move the invisible coatings, which latter cannot be recognized except by the sense of touch. Each operator will have his favorite shapes of orange wood points; however, the largest-sized sticks are a saver of time and strength. The flat ribbon dental floss is best for the work, as it spreads out on the proximal surfaces, not endangering the gum tissue. The waxed is better where the teeth are in contact, while if they are separated the unwaxed is more efficient.

We must develop the tactile sense to the highest possible degree, for in this treatment we have little else to guide us. It is best to scale one tooth thoroughly, remove from the pocket any dead tissue or foreign substance, and then after medicating it, allow it to rest until you have completed the scaling of the other teeth. If the pocket has not healed by that time, there is more work in it for you to do. Nature will do wonders if you give her half a chance, so do not depend upon medicaments, for they are only her assistants. Do your work thoroughly and watch results. For the comfort of the patient, however, do not send him away without any medication, for by using a healing solution and an astringent wash, the gums will not be so sore after the treatment. The "1-2-3-4 solution," Carr's remedy (containing, 1 phenol, 2 tincture of aconite, 3 tincture of iodin and 4 glycerin, in the proportions and order named), is very effective in reducing inflammation and is excellent to apply to gum tissue around the teeth scaled, before dismissing the patient. Be sure to tell your patient, before he leaves the chair, that his gums are liable to be sore that day and possibly the next because you have been working around inflamed tissue. He will feel much more kindly toward you if you take the trouble to do this. Patients resent surprises of this kind.

After completing the curative treatment we should dismiss our patient for one month, and then when he returns there should be no deposits visible. Many will take exception of this treatment, but the writer firmly believes that it is possible in almost every case where we have been conscientious and thorough in our work, given the patient proper instructions and efficient materials suited to the care of his particular case, and have obtained his cooperation.

The writer does not wish to leave the impression that she has

attained her ideal in every case, and that she has complete control of all her patients. That would be unreasonable and untrue. However, the results of her experience have been such that she believes, without doubt, that fully 98 per cent of the cases can be controlled, and with them our ideal realized. Of course, this would be true only among an educated class of people, and providing, of course, that the cases were not hopeless when we began. This latter condition is apt to discourage many an eager beginner, and here I would enter a plea for suffering humanity. Do not tell your patients pyorrhea is incurable, even if you cannot successfully treat it yourself. If you do not believe it can be cured, at least tell your patients that some claim to cure it. You will lose nothing by this, instead you will win much respect, not only from your patients, but from members of your profession.

If these few pages contain any suggestions which will help a beginner in this most important work, the writer will be fully repaid for the time spent in writing this article.—*Dental Summary.*

COMMENTS ON GENERAL PRACTICE. By W. E. Tennant, D.D.S., Fond du Lac, Wis. Throughout the whole field of dentistry, and in the very essentials of its practice, there is little that seems to be settled or agreed upon; and until such means as the appointment of an international commission (as has been suggested) is selected to recommend to our colleges, and enforce therein a uniform teaching, a wide difference in ideas and methods must be expected.

Of course, many good men differ in opinion, and to anyone that has subscribed and read two or more of our various dental journals this is very apparent, as we find articles by men that perhaps stand equally high in the esteem of their fellow practitioners, who seem to disagree entirely upon standard methods of practice. Therefore, I may have some small excuse today for giving you the results of a few ideas, clippings, jottings (not all original by any means) and a few formulas that perhaps will give you some small benefit.

A noted surgeon once said: "We are often astonished to find that the unexpected happens when we least expect it; and many

times we learn things on investigation that were never dreamed of before—even simple things that are, however, fundamental. It took me fifteen years of close application in cleft palate operations before I learned that the upper jaw is as much wider than the lower as the space between the edges of the fissure—and yet it was before me all the time."

Extracting nowadays is perhaps a diminishing phase of our work, yet there is still too much of it done. Some patients presume to dictate to us our duty; and many of us are too often swayed by their judgment, which is usually poor.

A tooth with a small cavity, or perhaps a root that needs a crown, will give trouble. The dentist that extracts in these cases does a double injustice—one to himself and a greater one to the patient. Just simply refuse to extract these unnecessary cases, and if someone else does it, you won't have the crime laid at your door at any rate. And while I am saying something about extracting, let me say that the man that extracts a tooth nowadays that is good enough to be filled or crowned, without first using his utmost efforts and intelligence to save that tooth by telling the patient his mistake, is not a whole dentist at all—in fact, he is just a "tooth carpenter," and is not living up to the twentieth century ideal in any sense of the word.

Crown work should be advocated, when indicated, also inlay work—many patients leave dentists' hands in every city that need and are willing to pay for this kind of service, but it is not recommended to them or even referred to. Surely we are the ones that should know the business and we should suggest and advise these things. How are we to expect to do this class of work if we do not?

Many times the anterior teeth can be made to look at least 95 per cent better by grinding off the rough and sharp and ragged edges, and patients will be surprised at the radical change and wonder why it was not suggested to them before.

Some people expect because we have done work for them at some previous date that we are forever going to keep that tooth or those teeth in good condition, and if a filling fails after a reasonable length of time or it needs treating, they assume we should do it gratis. This is absurd and we should refuse to guarantee to

replace a filling after one year, and even that sometimes is foolish. A physician does not guarantee to keep you well, neither should a dentist guarantee to everlastingly keep a tooth comfortable just because he had operated upon it previously.

We as a profession are expected to do more for less money than any other, and I for one think it high time there is a change instilled into the minds of these people, and as a society I would be glad to have a resolution introduced to the effect that we get paid for our services every time, with no exceptions but one—the case where it is very evident that poor service was rendered (that is, below the average). We cannot always give the best of service, and because we do not, it is no reason why we should not expect a fee. If we do an average service that is all that anyone of us can expect to do; therefore charge for it every time.

Many of us never advise our patients to return for examination semi-annually or perhaps earlier if necessary. These patients come back to us in, say, three or four years a sight to behold, and the work in which we took so much pride and thought was ideal is a mass of ruins; and the patient draws the conclusions that dentistry is only a very "temporary affair" after all.

Then we are too prone to get a dollar for a "cheap job" of "cleaning," when perhaps if we had done the work properly it would have taken us three times the amount of time spent in doing the service, and we should charge just three times the fee that was charged. I have seen patients (and many of them) turned away from good operators, and the deposits on the teeth had not been touched, and the stains not all removed, and yet they had paid their little dollar and been told that they had a real case of "cleaning" performed.

We often wonder why some people do not come to us, or why we are not more busy, when, if the truth is known, we have the reputation of being "barbarous" in our treatment, or lack a little of the sympathetic feeling that is appreciated by us while we are in the dental chair. This carelessness and awkwardness keeps away about 70 per cent of the people from us, and if we can do a little sum in arithmetic we can see that our annual income is curtailed in like proportion. To the man "without a heart" let me say, sit in the chair yourself and take a little of the same medicine,

in doses the size that you administer about every third day, and I predict that between times a small heart will grow within your calloused body that will last for forty-eight hours at least.

Did you ever stop to think that the deciduous teeth are there for a purpose, and not to be extracted as soon as they start to give trouble? You all know that the majority of irregularities are caused by extracting these teeth too soon (a few cases too late), and yet it is done every day.

A prominent dentist was on a vacation, and while away his son, about eight years old, was compelled to call on another dentist from trouble in an aching cuspid. The dentist extracted that cuspid, and you can imagine what an injury he inflicted upon the boy. When the father returned home the deed was done, but I'll venture to say that that man has never committed that crime since.

Another thing—never deceive a child; if you are going to cause pain, tell them so; and they, if ordinary children, will be able to bear it better. First, get the confidence of the children, and keep it by not deceiving them, and they will be your patients as long as you are in the community.

And in regulating I have often extracted where I felt that I could not regulate without this method; but truly, gentlemen, the more of this work I do, the more I am convinced that never should we extract in orthodontia.

William G. Law says: "Extraction has no place in modern orthodontia. We do not even admit of rare exceptions, as was done by us a few years ago. The loss of teeth makes the treatment of these cases more difficult and a failure from the standpoint of occlusion and facial balance, because the arches are so constructed that the removal of one tooth ruins the possibility of that mutual support which each tooth renders to its neighbor, and to the entire denture, which under conditions of normal occlusion always exists."

One other thing that is often needlessly done is the application of ligatures. While there may be exceptional cases that require a ligature, I will venture the assertion that 99 out of every 100 that are applied are unnecessary, and if there is any one thing that injures the gingivæ and causes intense pain it is this indiscriminate application of this pernicious method.

For sensitive cavities try a saturated solution of potassium carbonate in glycerin, or a saturated solution of zinc chlorid in alcohol; both working very well.

The Buckley alterative treatment for abscess or acute pericementitis caused from ptomains being forced through the apex of the root is as follows:

℞ Potassii iodidi .....ʒj
Syrupi sarsaparillæ comp.....f ʒiij—m.
Signa—Take a teaspoonful three times a day after meals—dose to be added to a wine glass of water.

You will find it is very good.

A good separating fluid may be made by making a saturated solution of paraffin in gasoline.

If you have trouble in plates being porous, place above the water line (using very little water) upon a suitable support and the trouble will be obviated.

Try trichloracetic acid 50 per cent for melting away the gum overlying third molars, being careful not to let it get into the throat or upon the cheek, by the use of cottonoid rolls; and perhaps if the flap is large enough inject cocain hydrochlorid and cut it away first, which will relieve materially these painful cases.

In Chicago, at a recent clinic, Dr. J. E. Keefe demonstrated that any pain arising from the fifth nerve could be temporarily stopped by injecting into the nostril from a watch-case atomizer two or three injections of equal parts of water and alcohol. The pain would disappear in from ten to fifteen seconds.

A free application of camphophenique after setting a crown will relieve the pain.

In repairing plates dry pack with vulcanizable guttapercha and save time and trouble.

In syringing the mouth do not interfere with the muscles and the water will not run out at the corners.

A little beeswax and resin will prevent the engine cord from slipping.

In applying arsenic trioxid to a cavity that extends below the gum, moisten the cavity with eucalyptol, then completely fill with temporary stopping—then drill a hole through to the point where

you wish to make the application, cover over the arsenical preparation, closing the opening with more guttapercha, and there is no danger of poisoning the gum tissues.

Care for the pregnant woman's teeth and don't be foolish and tell her her condition will not warrant it—an aching tooth will give her far more nervous trouble and worry than you will in attending to the disease.

Remember that oil of cassia will discolor teeth and that you do not need it in the office at all.

Also that extracting and replanting has cured many an abscess where all other means have failed.

The sodium dioxid used for bleaching purposes must be pure—and there are well-known tests to determine the purity of the drug.

Boiling instruments is the best means of sterilizing them (add 5 per cent sodium carbonate to the water to prevent rust) and this should be done more often than the average dentist is in the habit of doing. Think of using instruments contaminated with blood, mucus and saliva for several patients before they are sterilized. It is a slovenly method, to say the least.

For the putrescent pulp Buckley's formalin and cresol, equal parts, is the best thing in my hands, but A. W. Harlan claims equally as good results with monochloracetic acid, and says it will bleach the tooth at the same time if discolored.

Lactic acid cleans the saliva tube. A 20 per cent solution of argyrol injected into the pus pockets in pyorrhea will clean things up materially.

For supporting a sore tooth while drilling, make a splint of modeling compound for both the buccal and lingual sides. This will hold steady and prevent pain from the jar of the bur.

For the weeping canal seal in a dressing from the bottle containing:

℞ Thymol,
Menthol, ... aa gr. iij
Eucalyptol, ... f ℥j—m.

(Use eucalyptol—not oil of eucalyptus.)

A good local anesthetic formula is as follows:

℞ Cocainæ hydrochloridi .....gr. vj
Phenolis .....mij
Aquæ menthæ piperitæ.....℥j—m.

The peppermint water as a vehicle will mask the taste of the cocain and the solution will keep much longer than if made from ordinary distilled water. Nineteen m. of this solution contain ¼ gr. of the alkaloidal salt, the amount we are justified in injecting into the system at one time. Simply dry out the hypodermic needle with hot air after boiling and it will not need any wire inserted in the opening.

Another thing is removing the arsenic preparation from a tooth and filling the canal immediately. Even if the pulp is dead and can be removed painlessly, that is no sign that the root should be filled; that canal should be thoroughly sterilized before filling, as I hold that it is next to impossible to completely sterilize in a few moments the tubuli of that tooth—and if you chance to open into that tooth a year or so later you will find it in a bad smelling condition.

One more thought—the matrix should be used always in proximal cavities in the posterior teeth, whether it is gold or amalgam. You can pack your material much better, get a denser filling, contour it better, keep it away from the gum margin, and the filling is half polished when you remove the matrix. Particularly is this true with amalgam; the tendency is to pack the interproximal space full of the material; and I regret to say that many times this is left in this position, making, when hard, a constant irritation to the gum margin and a bad and slovenly operation at the best.

Dr. A. C. Hewitt of Chicago has found almost a panacea for all ills that befall to the lot of a dentist to treat, in echafolta, and even advises him to keep it within reach at all times, wash the razor with it, apply it to the face after shaving, etc. The practice of dentistry is a trying, nerve-racking work at the best, and if there is a class of people that needs the road made a trifle more smooth, it is our humble selves; therefore, this is my sole excuse for presenting a paper of this nature. Let us hope that Dr. Hewitt this wonderful drug.—*Dental Review.*

will teach us how to soothe our wounds and allay the pain with

AMALGAM. By C. P. Pruyn, M.D., D.D.S., Chicago. The filling of cavities of decay in teeth with amalgam has been going on for more than seventy years, and while many mistakes have been made in its preparation, a very much better quality of material has been furnished us during the last ten years than ever before. The extensive series of experiments that were made several years since in the expansibility and contractibility of different formulæ by Dr. G. V. Black and his assistant, and also by Dr. P. J. Kester, has stimulated all manufacturers of this material to furnish us with an alloy that is very much less eccentric in its behavior than were the alloys of former years, and while perfection has not yet been reached in the various combinations of different metals to make an unchanging, non-shrinkable, non-expansible amalgam, we do rejoice in the fact that a marked advance has been made during recent years, and the writer of this paper predicts that within the next quarter of a century still more startling improvements will be made in the manufacture and use of alloys for filling teeth. There are many cavities difficult of access where gold fillings or gold inlays or porcelain inlays are not indicated, where this material can be used with very much better advantage as a saver of frail teeth than anything else known to mankind. And often in such places the color objection to its use is almost nil, because it may be placed where it will not show in ordinary conversation. I would not say that as teeth need saving it is the very best material to use, but I will say that it is the very best material to use in certain cases. And those certain cases are the distal surfaces of badly decayed bicuspids and molars where gold is used on the mesial and occlusal surfaces of the same teeth, and the two materials, gold and amalgam, placed in complete apposition or physical contact in the same tooth, so that the chemical or metallic affinities of the dissimilar metals are satisfied by their absolute contact, so that the baser of the combination of metals becomes oxidized or sulphidized, and the king of metals remains unusually bright and clean. And as the result of this physical union a peculiar molecular condition results in the amalgam, which seems to assist it in retaining its form and resistance to stress or force. I think it is a well-recognized fact that around such amalgam fillings as above described there seems to be some influence at work which inhibits the proliferation and growth of the microbes of dental caries. What that something is, our bacteriolo-

gists and pathologists have not yet found out, but the fact remains that frail teeth filled in this manner will resist the ravages of caries very much better than if filled with either gold or amalgam alone.

If such fairly satisfactory work can be done with the old inferior forms of amalgam when used with conscientious thoroughness, have we not a perfect right to expect very much better results from the more recent and scientifically prepared alloys that are on the market today?

The curses that have been hurled at amalgam *per se* might much better have been hurled at the heads of the careless, slovenly operators, who have brought this most excellent material into disgrace. When men think amalgam is a cheap, poor material with which to fill cavities in teeth, it is to be assumed, from what we see of their operations, that they did not take the necessary trouble to properly prepare the cavities and to properly insert the fillings. Cavity preparation for amalgam should differ from that for gold, in that no marginal beveled edges should be left, as amalgam will not retain an attenuated edge like gold, and this little error has often been the cause of failures, because the source of the trouble was not recognized. Another cause of failure in amalgam fillings is improper or incomplete insertion or condensation. Large masses of amalgam in comparison with the size of the cavity and large pluggers with which to insert and condense the filling cannot produce as satisfactory results as small masses and relatively small pluggers. The first pieces of amalgam placed in the cavity should be a little softer than those that follow, so that the softer pieces can readily be adapted to all pits, grooves or angles, and the subsequent pieces being drier than the preceding ones can, by trituration and packing, be united to those that have gone in before, and a thoroughly homogeneous mass be the result, with the obliteration of air spaces between the filling and cavity walls.

I make this bold statement that no one should fill a cavity of decay in a patient's mouth who has not experimented with the use of amalgam in filling glass tubes. If anyone thinks he can make a perfect filling in a tooth, just let him fill a glass tube with amalgam and see how difficult it is to fill all the air spaces and make a beautiful homogeneous mass of it. And I will venture the assertion that he will have the egotism or conceit taken out of him in short order. Of course, you understand that it is possible to take amalgam mixed

so very soft that a glass tube can be very easily filled, and all air spaces obliterated, but I am not referring to that kind of slovenly operating. I refer to the use of amalgam that is sufficiently dry, so that it will have all the edge strength it is capable of, and still be soft enough to remain in a homogeneous mass and be in absolute contact with the walls of the tube or cavity. It takes time to insert a good amalgam filling, and it should always be done under absolute conditions of dryness, the same as with the use of cohesive gold, if you wish to obtain the best results.—*Dental Review.*

SEPARATING FLUID.—To a strong boiling solution of borax, add shellac scales till the liquid becomes very dark in color—boiling and stirring constantly till shellac is all dissolved. It dissolves nicely, but makes a muddy-looking solution, which is, however, a good chemical solution, of very dark red color. In using this separating fluid it is not necessary to wait for the impression to dry, but on taking it from the mouth it is rinsed, dried and given a thin coating of the fluid, allowed to stand one or two minutes—long enough to mix the plaster for the model—and then the model poured at once, thus allowing no time for the impression to become distorted. When separated, the model will be found to have a very desirable, glossy surface.—L. H. ARNOLD, *Dental Review.*

FILLING ROOT-CANALS WITH PARAFFIN.—The root-canal having been sterilized in the usual way, is dried with alcohol and hot air, followed by the copper-wire point, heated electrically, until the dentin has been thoroughly warmed. Sterile paraffin in liquid form is now introduced from a hypodermic syringe—such a syringe being filled and kept for the purpose—or in solid form, by placing a pellet of the same at the pulpal orifice. The hot wire point is now carried through the paraffin and to the apical end of the canal. The paraffin is instantly liquefied, and follows the metal conductor with great certainty to the extreme end. Air-bubbles are "tickled" out and the hot wire is allowed to remain a few moments to insure the thorough adaptation of the liquid against or into the heated dentin. Upon cooling, the paraffin shrinks toward the center, leaving the periphery in absolute contact with every portion of the root-canal.

In canals of small caliber the force of capillarity overcomes that of gravity, so that the roots of upper teeth may be readily filled. In large canals, or in upper teeth, however, it may be found difficult to expel the air-bubbles. In such a case a cold gutta-percha point of proper size may be carried into the liquid paraffin and allowed to remain.

The chief advantage of this method is a perfect sealing of the canal by an inert material, which can be inserted and removed without pressure.—W. B. DUNNING, *Dental Cosmos.*

The Dental Digest.

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All communications relating to the editorial department should be addressed to Dr. J. P. Buckley, Editor, 163 State Street, Chicago.

Editorial.

THE PHARMACOPEIA AND ITS NOMENCLATURE.

In carefully reading the dental literature as it appears in the journals from month to month, as the editor of the DIGEST has been obliged to do for the last eighteen months, one is impressed with the lack of uniformity of dental nomenclature, as well as the nomenclature used by the various writers of drugs and medicines. It was shown by Dr. S. H. Guilford, in the last issue of the DIGEST, that dental nomenclature was sadly in need of revision, and at the present time there may be some excuse for the manifest lack of uniformity; but this cannot be true in regard to the proper naming of drugs and medicines.

In this editorial, therefore, we shall briefly discuss the nomenclature of the United States Pharmacopeia, which is the legal authority for medicines in this country.

The nomenclature of the Pharmacopeia is alphabetical throughout, and in it, to a great extent, can be found the description of articles according to their derivation.

In the naming of chemicals the English titles are reversed, e. g., calcium sulphate instead of sulphate of calcium; sodium chlorid instead of chlorid of sodium, etc. It can readily be seen that this is in accordance with the formula for the various chemicals, as $CaSO_4$, NaCl. To name chemical substances without designating them in correct chemical terms is as misleading as it is unscientific. We frequently see in our literature the expression "lime salts" used in reference to the chemical composition of teeth. Viewed from a purely chemical standpoint the expression is meaningless; for there can be no salts of *lime*—lime being a compound composed of cal-

cium and oxygen (CaO). It is generally understood that by "lime salts" is meant calcium salts; therefore, it is just as easy to use the latter expression, and it is far more scientific and correct. In this connection we will also say that since the Pharmacopeia now recognizes what was formerly erroneously called arsenous acid and carbolic acid by their correct chemical names, *arsenic trioxid* and *phenol, respectively,* there is no logical reason why these erroneous and misleading names should longer appear in our literature

The naming of drugs of botanical origin is not so frequently abused; but the journal literature shows a woeful lack of knowledge of pharmaceutical nomenclature. The fact that the Pharmacopeia is the legal authority for medicines in the respective countries gives to the nomenclature of pharmaceutical preparations a significance scarcely realized and little appreciated. Because of this lack of appreciation by the profession, manufacturers of proprietary dental remedies are enabled to dispose of preparations, under captivating and misleading titles, many of which are of doubtful composition and questionable therapeutic value. The pathetic side of this tidal wave of proprietary remedies is that the profession in general is an easy prey to the venders; the redeeming feature is found in the fact that many legitimate firms are earnestly striving to serve the profession in a purely ethical manner. If dentists would acquaint themselves with the Pharmacopeia and the nomenclature of the pharmaceutical preparations therein contained, they would find in the many official waters, liquors, syrups, spirits, elixirs, tinctures, fluid extracts, tablets, powders, ointments, liniments, etc., or a combination of two or more, a counterpart, or better, of almost every proprietary preparation on the market today.

The Pharmacopeial committee, in order to counteract the miscellaneous prescribing of commercial articles of less definite composition, introduced several new preparations in the last edition of the Pharmacopeia. Three of these are of practical value to dental practitioners, viz.: Liquor Antisepticus (antiseptic solution or mouth wash), Oleatum Cocainæ (oleate of cocain, 5 per cent) and Pulveris Acetanilidi Compositus (compound powder of acetanilid).

Liquor Antisepticus contains the following ingredients:

Boric acid	20.00 Gm.
Benzoic acid	1.00 Gm.

Thymol	1.00 Gm.
Eucalyptol	.25 c.c.
Oil of peppermint	.50 c.c.
Oil of wintergreen	.25 c.c.
Oil of thyme	.10 c.c.
Alcohol	250.00 c.c.
Water to make	1,000.00 c.c.

This solution is an excellent antiseptic mouth wash. In prescribing it, it is never necessary to write a prescription for these various ingredients. Here we learn the practical application of our knowledge of pharmaceutical nomenclature. All we have to do in prescribing this preparation is to write its official title, as follows:

℞ Liquoris antiseptici, f ℥viij

Sig.—Use as a mouth wash.

If for any reason we desire an astringent solution as well as antiseptic, as in cases of pyorrhea and "rubber sore" mouth, zinc phenolsulphonate can be added, as:

℞ Zinci phenolsulphonatis, ℥ss

Liquoris antiseptici, f ℥viij—m

Sig.—Dilute with one-half warm water and thoroughly rinse the mouth.

Oleatum Cocainæ contains five per cent of the alkaloid, cocain, dissolved in oleic acid. A prescription should never be written for this preparation, as it should only be applied by the dentist. It is unnecessary here to elaborate on the dental application of this preparation. It can be used in selected cases for sensitive dentin and to obtund the irritated gum and pericemental membrane in setting crowns and bridges.

Pulveris Acetanilidi Compositus contains:

Acetanilid	70 parts
Caffeine	10 parts
Sodium bicarbonate	*20 parts*

In cases where antipyretic or analgesic drugs are indicated, it is far safer and better practice to prescribe such recognized drugs as *antipyrin, phenacetin or acetanilid, than to miscellaneously prescribe* proprietary preparations the constituents of which were not known previous to the passage of the Pure Food Law, without resorting to chemical analysis.

In prescribing the above powder, we again avail ourselves of the knowledge of pharmaceutical nomenclature and write as follows:

℞ Pulvis acetanilidi comp., gr. xij
Fiat chartulæ No. 2.
Sig. Take one powder at once and the other in two hours, if not relieved.

This discussion could be carried farther with interest and profit; but we trust enough has been said to emphasize the importance of the subject. In order to intelligently prescribe remedies it requires a knowledge of the Pharmacopeia and the nomenclature of drugs and medicines therein contained; but surely this is not too much to expect of the trained dental practitioner of today.

Correspondence.

EROSION TREATMENT.

Editor, DENTAL DIGEST:

Dear Sir:—Replying to Dr. W. H. Trueman's letter in response to my erosion inquiry, I wish to assure the Doctor that I do not confuse erosion and sensitive necks of teeth, though the language I used may have been somewhat misleading.

Dr. Trueman's statement that the treatment that I gave, as he understood it, "relates to the sensitiveness of teeth, due, it is presumed, to gum recession," shows me clearly that I did not make my meaning plain. There would seem to be no more reason for confounding erosion and sensitive necks of teeth than for confounding sensitive necks and caries. All are more or less sensitive, but that is about the only thing that any of them have in common.

The sensitiveness of eroded teeth, I agree with Dr. Trueman, is not a constant symptom; but it is the only symptom that the patient is apt to be able to notice promptly, and therefore I use it in my final instructions.

With the etiology of erosion, while it is a very interesting study, I did not intend to meddle. I intended to get only the treatments of as many of the readers of the DIGEST as possible, the object being to see if some satisfactory general outline of treatment could not be arrived at. I again quote Dr. Trueman's letter: "At other times it (erosion) steadily progresses in spite of all that has been done."

Evidently the results of Dr. Trueman's treatment have not been as satisfactory to him as the results of my treatment have been to myself and to my patients, and I say it in no spirit of boasting, but as a simple statement of fact. However, as Dr. Trueman has not yet given his treatment for erosion, no chance is afforded the rest of us to learn anything from it. Will he not please tell us what he has been doing in these cases?

I quote again: "When we undertake to sterilize a tooth, or a portion of a tooth, by forcing a sterilizing agent into its tissues, are we making that tooth a better tooth?"

If the undertaking to sterilize a portion of a tooth does *not* make that tooth a better tooth, why attempt to serilize the canal and adjacent portion of the dentin of a "devitalized tooth? Why sterilize a cavity (surely a portion of the tooth) before filling?

I answer his query, yes, any tooth infected with injurious microbes is the better for the infected portion being sterilized. However, I did not advocate the sterilization of the whole tooth in erosion. Neither may the sterilizing agent be fairly said to be "forced" into the tissue of the tooth. It is rather drawn into the pathologically enlarged ends of the unnaturally exposed, infected tubuli by capillary attraction, thereafter preventing, as long as the paraffin and sterilizing agent remain, the recurrence of further microorganic activity in the so-sealed ends of these tubuli.

Regarding the arrest of loss of tissue by this treatment, I would say that, so far as one may trust the eyes, cases that I treated several years ago show no further wasting.

As to injuring the tooth by the treatment advocated, the only possibility of injury would be by extreme and unwarranted heating of the tooth, but as the patient would undoubtedly have a good deal to say before actual injury occurred, there is no chance for injury even in that direction.

In conclusion, I wish to say that it gives me great pleasure to discuss this subject with gentlemen of Dr. Trueman's well-known ability and standing, and I trust that he, and others as well, will see fit to write further on this obscure subject.

LUCIEN H. ARNOLD, D.D.S.

Chicago.

Obituary.

J. A. DAVIS, 36 years old, a dentist of Rock Island, Ill., died October 15, 1908.

F. P. BEHNKE, 35 years old, a dentist of Milwaukee, Wis., died October 16, 1908.

JOHN C. BOWER, a well-known dentist of Ottawa, Ont., dropped dead October 15, 1908.

WILL CALLAWAY, a dentist of Lamar, Mo., died at Nevada, Mo, November 10, 1908.

FRANK A. RYDER, one of the best-known dentists of Lynn, Mass., died October 12, 1908.

DWIGHT ARNOLD, a former Boise (Idaho) dentist, died at Long Beach, Cal., October 11, 1908.

J. H. P. BENSON, a dentist of Washington, D. C., died from Bright's disease, October 6, 1908.

S. B. TOWLE, a dentist of Sheridan, Wyo., died from the result of an operation, October 23, 1908.

ROBERT SABIN, 34 years old, a dentist of Salt Lake City, died from heart failure, November 9, 1908.

ADOLPHUS WENGENROTH, 58 years old, a dentist of Boston, Mass., died suddenly, October 22, 1908.

LLOYD T. MACGILL, 79 years old, one of the oldest dentists of Frederick, Md., died October 30, 1908.

JOHN T. WISNER, 75 years old, the oldest dentist in the county, died at Wooster, O., November 8, 1908.

PETER HALL, 40 years old, a dentist of Spokane, Wash., died after a three days' illness, October 18, 1908.

JOSEPH ANSON BATES, 70 years old, a well-known dentist of Baltimore, died from heart failure, October 23, 1908.

H. D. WHITNEY, 66 years old, a dentist of Hartford, Vt., died, following a stroke of paralysis, October, 1908.

SAMUEL WAIT, a well-known dentist, of Brooklyn, died from apoplexy, in Washington, D. C., November 5, 1908.

ROBERT M. HETTINGER, one of the leading dentists of Appleton, Wis., died from heart failure, while sleeping, November 13, 1908.

J. EDWARD HALL, a dentist, formerly of St. Louis, Mo., one of the most noted dentists in the Orient, died from hydrophobia, in October, 1908.

ABNER COOK CRYSLER.

The subject of this sketch was born at Drummondville, Ontario, Canada, within sight and sound of the great Niagara cataract, January 5, 1834; departed this life at Preston Springs, August 29, 1908, at the advanced age of 74 years.

He began his professional career at Clifton (now Niagara Falls, Ont.), remaining there for about three years. In 1865 he moved across the river to Niagara Falls, N. Y., practicing there with marked ability and success until 1897, when he returned to his original field of operations. For several years he followed his vocation until the infirmities of age compelled him to desist from further effort.

But all these years were notable ones, for Dr. Crysler and the profession he adorned. By diligent application, deep study, keen observation, natural adaptability and inventive genius he became a recognized leader and authority in scientific and progressive dentistry in this and many other lands, a reputation he never forfeited amid all the mutations of the intervening cycles of time. In his early days he was the peer of the very best in the profession anywhere; in some of what are considered the advanced branches of the present day he was a pioneer—always "ahead of the times;" in his declining years he kept in close touch with the most modern and scientific processes.

In addition to unexcelled skill as a practitioner, he possessed a geniality of temperament that made him at all times and under all circumstances a

most agreeable companion. Indeed, this trait was of so pronounced a character at times as to act as a deterrent in the matter of climbing the ladder of fame, which he was normally capable of doing far and away in advance of others who subsequently achieved distinction along lines to which he was no stranger.

Ripe in years and experience, rich in professional honors if not in worldly goods, the good old soul has laid aside forever the delicate implements he could so masterfully manipulate, crossed the metaphorical bridge of sighs and undoubtedly wears a deserving crown of gold.

R. G. W.

J. H. P. BENSON, D.D.S.

At a special meeting of the District of Columbia Dental Society, held October 7, 1908, the following resolutions were adopted:

WHEREAS, This Society has heard with feelings of sincere sorrow of the death of one of its cherished members—Dr. J. H. P. Benson—it is

Resolved, That in the death of Dr. Benson this society has lost one of its most valued members—a man of sterling integrity, unswerving loyalty and an always sympathetic friend. A man who so fearlessly performed every duty to his profession and to this society that he had won his way to a very honorable standing among those with whom he associated.

Resolved, That in the death of Dr. Benson the profession of dental surgery has lost one of its most valued members, who, in a modest but forceful way, contributed much to the uplift of his profession, by his methods of practice and by his equipment as a teacher of many years' experience.

Resolved, That this society extends to his bereaved family its sincere sympathy, and that a copy of these resolutions be forwarded to his widow and that copies be sent to the dental journals.

Resolved, That this society attend the funeral in a body.

H. C. THOMPSON,
C. W. SCOTT,
H. J. ALLEN.
} Committee.

Notices.

SOUTHWESTERN (TEX.) DENTAL ASSOCIATION.

The fourth annual meeting of the Southwestern Dental Association was held in San Antonio, October 11, 1908, and officers for the ensuing year were elected as follows: President, J. H. Graham, San Antonio; Vice-President, T. A. Anderson, Corpus Christi; Secretary-Treasurer, F. W. Smith, Austin.

We reinsert this notice, since an error was made in our October issue as regards the last-named appointee. The office of Secretary-Treasurer is to be filled by Dr. Smith for another year, and not by Dr. Cavender, as previously announced. The latter gentleman holds office as Chairman of

the Executive Committee, being associated therein with Dr. F. B. Tegener, Seguin, and Dr. J. D. Simms, Austin.

DANVILLE-CHAMPAIGN (ILL.) DENTAL ASSOCIATION.

The annual meeting of the Danville-Champaign Dental Association was held in Champaign, November 12, 1908, and officers for the ensuing year were elected as follows: President, H. E. Davis, St. Joseph; Vice-President, E. M. Bush, Danville; Secretary, G. C. McCann, Danville; Treasurer, J. L. Rideout, Danville.

SOUTHERN ILLINOIS DENTAL SOCIETY.

The twenty-third annual meeting of the Southern Illinois Dental Society was held in Greenville, October 27 and 28, 1908, and officers for the ensuing year were elected as follows: President, T. T. Baker, Litchfield; Vice-President, C. H. West, Farina; Secretary, A. W. Rue, Alton; Treasurer, A. T. Strange, Litchfield.

NORTHERN ILLINOIS DENTAL SOCIETY.

The twenty-first annual meeting of the Northern Illinois Dental Society was held in Freeport, October 21 and 22, 1908, and officers for the ensuing year were elected as follows: President, H. G. Logan, Aurora; Vice-President, G. L. Banzel, Chicago; Secretary, Fred H. Bowers, Freeport; Treasurer, C. L. Smith, St. Charles.

NORTHEAST MISSOURI DENTAL ASSOCIATION.

The annual meeting of the Northeast Missouri Dental Association was held in Moberly, November 10 and 11, 1908, and officers for the ensuing year were elected as follows: President, J. T. Fry, Moberly; Vice-President, R. H. McKinney, Hannibal; Secretary-Treasurer, R. W. Burgess, Paris. The next meeting will be held in Hannibal.

WEST VIRGINIA STATE DENTAL SOCIETY.

The second annual meeting of the West Virginia Dental Society was held in Fairmont, October 15, 16 and 17, 1908, and officers for the ensuing year were elected as follows: President James Dowden, Sr., Fairmont; 1st Vice-President, J. H. McClure, Wheeling; 2d Vice-President, L. G. Walker, Grafton; Secretary, F. L. Wright, Wheeling; Treasurer, D. C. Clarke, Blacksville.

NORTHEASTERN (CONN.) DENTAL ASSOCIATION.

The fourteenth annual meeting of the Northeastern Dental Association was held in Hartford, October 21, 22 and 23, 1908, and officers for the ensuing year were elected as follows: President, James E. Powers, Providence, R. I.; 1st Vice-President, Ned A. Stanley, New Bedford, Mass.; 2d Vice-President, Henry A. Kelley, Portland, Me.; Secretary, Edgar O. Kinsman, Cambridge, Mass.; Assistant Secretary, Charles F. Kreppel, For-

est Hills, Mass.; Treasurer, Frederick T. Murlless, Jr., Windsor Locks, Conn.

BURLINGTON DISTRICT OF THE IOWA STATE DENTAL SOCIETY.

The annual meeting of the Burlington District of the Iowa State Dental Society was held in Keokuk, October 13, 1908, and officers for the ensuing year were elected as follows: President, J. W. Marsh, Keokuk; Vice-President, J. F. Cooke, Burlington; Secretary, W. H. Chapman, Burlington; Treasurer, E. B. Hazen.

UNIVERSITY DISTRICT OF THE IOWA STATE DENTAL SOCIETY.

The annual meeting of the University District of the Iowa State Dental Society was held in Iowa City, November 3, 1908, and officers for the ensuing year were elected as follows: President, J. J. Booth, Cedar Rapids; Vice-President, E. A. Rogers, Iowa City; Secretary, C. B. Whelpley, Cedar Rapids; Treasurer, B. H. McKeeby.

PENNSYLVANIA STATE BOARD OF DENTAL EXAMINERS.

Examinations will be conducted by the Board of Dental Examiners of Pennsylvania simultaneously in Philadelphia and Pittsburg, December 9 to 12, 1908.

For application papers or any information address

DR. NATHAN C. SCHAEFFER, Secretary, Dental Council,
Harrisburg, Pa.

DISTRICT OF COLUMBIA BOARD OF DENTAL EXAMINERS.

The next semi-annual examination of the Board of Dental Examiners of the District of Columbia will be held at the Georgetown University, January 4, 5 and 6, 1909.

All applications for examination must be accompanied by a fee of $10 and filed with the Secretary by December 22, 1908. For further information address

STARR PARSONS, M.D., D.D.S., Secy.,
1309 L St., N. W., Washington, D. C.

SOUTH DAKOTA STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the South Dakota State Board of Dental Examiners will be held at Sioux Falls, S. D., January 12, 1909, beginning at 1:30 sharp, and continuing three days. All candidates must bring appliances and materials necessary to do all kinds of filling, crown and bridge work, and articulate a full upper and lower set of teeth. A recent ruling of the Board makes it compulsory with all candidates to have their examination fee of $10 in the hands of the secretary before January 5, and

positively no candidates will be received who have not thus complied with said rule.

G. W. COLLINS, D.D.S., Secy.,
Vermillion, S. D.

INDIANA STATE BOARD OF DENTAL EXAMINERS.

The next regular meeting of the Indiana State Board of Dental Examiners will be held in the State House at Indianapolis, beginning Monday, January 11, 1909, and continuing four days.

All applicants for registration in the state will be examined at this meeting. For further information, blanks, etc., apply to the Secretary,

F. R. HENSHAW, D.D.S.,
Middletown, Ind.

INSTITUTE OF DENTAL PEDAGOGICS.

The sixteenth annual meeting of the Institute of Dental Pedagogics will convene in the Planters' House, St. Louis, Mo., December 30 and 31, 1908, and January 1, 1909. All teachers in dental colleges are cordiaally invited to attend and take part in the proceedings. An excellent program has been prepared and reduced railroad rates arranged, particulars of which can be had from Dr. D. M. Gallie, Chairman Executive Board, 100 State street, Chicago.

B. E. LISCHER, D.D.S., Sec.-Treas.,
Humboldt Bldg., St. Louis, Mo.

EXAMINATION OF DENTISTS FOR THE ARMY.

The Surgeon-General of the Army announces that, while there are no vacancies in the Dental Corps, he intends to hold examinations to establish an eligible list from which appointments will be made as vacancies occur.

Applicants for appointment as Dental Surgeons in the U. S. Army will be authorized to present themselves at the nearest military post at which a commissioned officer of the Medical Corps is stationed, for examination as to physical qualifications for employment, and those found physically qualified will be invited to report at West Point, N. Y., or San Francisco, Cal., about December, 1908, for the professional examination. No allowance can be made for expenses incurred in undergoing these examinations.

Application blanks can be procured upon application to the Surgeon-General of the Army. The essential requirements to securing an invitation are that the applicant shall be between 24 and 30 years of age, a graduate of a standard medical and dental college, and shall be of good moral character and habits.

Army dentists are employed under a three years' contract, at the rate of $150 per month; are entitled to traveling allowances and suitable quarters; they have the privilege of purchase of supplies at the Army commissary. The hours of official duty are from 9 a. m. to 4 p. m., although they are subject to emergency calls. During other hours they are per-

mitted to treat persons not entitled to gratuitous services with their own materials.

NATIONAL DENTAL ASSOCIATION.

At the 1908 meeting, the National Dental Association adopted an amendment making all members in good standing in their State Dental Societies, or their allied societies, eligible to membership in this association, by presenting to the proper authorities at the regular meeting a certificate signed by the President and Secretary of any such Society.

Those desiring to take advantage of their privilege under said amendment should act promptly, as the National Association meets early next year, the last Tuesday of March, 1909, at Birmingham, Ala.

Blanks can be secured from the secretaries of the various State Dental Societies or the undersigned.

H. C. BROWN, Cor. Secy.,
185 East State St., Columbus, O.

COLLEGE OF DENTISTRY, ALUMNI ASSOCIATION, UNIVERSITY OF SOUTHERN CALIFORNIA.

On Tuesday, December 8, 1908, at 9:30 a. m., there will be held at the College Building, Los Angeles, an Alumni Clinic. The morning will be devoted to clinics, followed by a business meeting, for the purpose of forming a permanent organization. The afternoon will be given over entirely to clinics, and in the evening the faculty will give a reception and dancing party at Goldberg's new hall, to the alumni and students.

The clinics will be conducted entirely by the graduates of the University, but other practitioners and the students are invited guests. There will be class meetings, dinners and other social entertainments to make the day a pleasant and memorable one.

The dental supply houses will make exhibits.

U. D. REED, 1900,
E. M. HARWOOD, 1901,
J. WALTER GRAY, 1902,
KATE D. BUCK, 1903,
ROY L. SPENCER, 1904,
M. M. DIXON, 1905,
R. C. LANE, 1906,
J. P. LAPE, 1907,
C. J. CRESSMER, 1908,
} Committee.

LATEST DENTAL PATENTS.

899,255. Dental casting machine, H. G. Maize, Philadelphia, Pa.
899,626. Tooth-cleaning device, C. P. Schultze, Munich, Germany.
900,363. Artificial tooth crown and securing means therefor, E. M. Fredericks, Chicago, Ill.

900,541. Dental appliance, E. E. Holmes, Indianapolis, Ind.
900,812. Dental blower, P. E. Williams, Savannah, Ga.
901,276. Dental plugger, J. C. Betts, Philadelphia, Pa.
901,835. Toothbrush, R. R. Ringer, Pittsburg, Pa.
901,841. Case for toothbrushes, R. Sewell, Cedartown, Ga.

News Summary.

SUICIDE.—James Lawson Wilson, 33 years old, a well-known dentist of Baltimore, committed suicide, by inhaling gas, October 31, 1908.

EXAMINING BOARD AFFAIRS.—At the October meeting of the Missouri Board, 12 out of 29 candidates were successful in passing the examination.—At the November meeting of the Oregon Board, 23 out of 27 applicants were successful.

POLISHING AMALGAM FILLINGS.—After filling has hardened sufficiently to be polished, smooth the surface with a large bur or stone, then use moose-hide points, or wheels, with moistened pumice stone, finish by using moose-hide points with Spanish whiting. This gives a highly polished surface.—W. H. BARNFIELD, *Dental Review.*

SUCCESS IN ORGANIZATION.—In order to make any organization successful there must be a willingness on the part of its members to undertake any work they may be called upon to do, with all the enthusiasm, endurance and action within them. He who acts from selfish motives or the hope of reward other than that of having done his task, and to have put the best there is in him into its performance, can be but transiently successful in any undertaking.—R. J. HOOD, *Dental Review.*

DIAGNOSING THE CAUSES OF MALFORMATION OF THE TEETH.—It is quite possible that syphilis may cause malformation of the teeth, but there are many other diseases which cause similar malformations of the teeth. Scarlet fever or any disease which interferes with nutrition of the teeth may cause a change in their forms. The diseases which may be confused with syphilis are, epithelioma of the lip, deep tubercular ulcers of the tongue, acute ulcerous gingivitis, the so-called canker sores, and herpes.—THOMAS L. GILMER, *Dental Review.*

ROBBERIES.—Drs. Potter, Corbiere and Shepard, Redding, Cal., gold valued at $200, October 5.—Dr. M. R. Grandits, San Francisco, gold valued at $15, October 12.—Drs. Thayer and Harriman, Pontiac, Ill., gold valued at $34, November 6.—Offices of eight dentists of Fort Wayne, Ind., visited recently, and gold valued at $400 taken.—Dr. E. E. Paxson, South Bend, Ind., gold valued at $25, October 31.—Dr. F. G. Blackburn, Shelbyville, Ind., gold valued at $20, November 6.—Drs. Cole & Porter, Iola, Kan., gold valued at $30, October 23.—Dr. Lura Fritzgartner, Wichita, Kan., gold valued at $20, October 20.—Dr G. C. Ferguson, Brooklyn, N. Y., instruments valued at $100, October 27.—Dr. O. W. Norton, Rochester,

N. Y., gold valued at $50, November 5.—Drs. A. R. Hengst & Corzilius, Columbus, O., gold valued at $100, October 14.

EXTRACTS NINE TEETH FOR ONE.—Unable to reach a dental office, and suffering untold torture from an aching tooth, James Ridley, residing in a remote part of the farming district, himself extracted nine teeth with a pair of pincers before he secured the right one. Ridley, for a greenhorn, made a fairly good job of it, but his gums were badly swollen and bleeding.—Philadelphia *Record*.

FATALITIES.—G. A. Quayle, a retired merchant of Morristown, N. J., died in the office of a New York dentist while under the influence of gas, October 16, 1908. Heart disease was the inducing cause.—Richard Martin, a young man of Calais, Vt., died in a dentist's chair in North Montpelier, October 20, 1908. Chloroform had been given, and he failed to revive from its effects.—Frank Jenochek, 23 years old, of Mt. Taber, Wis., died from blood poisoning, caused by an abscessed tooth, November 13, 1908.

CORRECT ROOT FILLING.—Prepare the canals properly and as thoroughly as possible. Use guttapercha mixture made by dissolving guttapercha in equal parts of chloroform, oil of cajaput and eucalyptol. After the chloroform has evaporated, a stiff mass is left, which can be picked up with the point of a hot root filler and carried to the apex of the canal. Make a point of gold by rolling No. 4 foil between the thumb and fingers, anneal and roll to suitable form for case in hand. The rolling will, with the annealing, stiffen the point sufficiently to allow of its being forced into the canal. After canal is moistened with guttapercha mixture, the point is forced home and packed to place. A minimum of guttapercha is used and no opportunity is left for absorption of secretions, as with guttapercha used alone. Cement can be used in place of guttapercha, and tin instead of gold. Preference is given the guttapercha mixture because it aids as a lubricant in the canal and an excellent effect is produced by the medicaments.—A. S. WALTZ, *Dental Review*.

ILLEGAL PRACTITIONERS.—A dentist of Toledo, O., was fined $50 and costs, October 14, for practicing dentistry without a license.—A dentist of Bowling Green, O., arrested recently for allowing an unlicensed dentist to prepare the teeth of a patient for crowning, was acquitted by a jury, October 20. Later he was again arrested on the same charge, on an affidavit sworn out by the Secretary of the State Board.—A case against a dentist of Ogden, Utah, for practicing without a license, for which he was recently adjudged guilty, is the seventh prosecution brought against him by the State Dental Board since he began practicing in that city.—Another dentist of Ogden, Utah, under indictment for practicing without a license, was arrested in Salt Lake City, at the instigation of his bondsmen, and will be returned to that city. Anticipating that he would not return for trial, the sureties withdrew from the bond, and his re-arrest was ordered.—A dentist of Spokane, Wash., was fined $50 and costs

for practicing without a license, October 16.—A dentist of Denver, Colo., arrested for practicing without a license, has been released. Bond was fixed at $100.—October 17, a dentist of San Francisco, arrested on the same charge, was sentenced to pay a fine of $50, with the alternative of 50 days in the county jail.

A Simple Method of Removing Bridges Without Mutilating the Abutments.—By using an instrument with a curved point that fits in the interspace adjoining the abutment; having the lower end curved up with a surface flattened so that a small mallet can be used, and with a few sharp, quick blows loosen the cement in the crown from the tooth. Each abutment is treated in the same manner. One may use a copper wire, No. 30 gauge, passing it through the interspace adjoining the abutment, bringing it down, forming a loop; and with a double-end burnisher in the lower end of the loop tap with a mallet to jar the cement loose, bringing the bridge away intact.—T. T. Baker, *Dental Review.*

Pressure Anesthesia.—The use of cocain in pressure anesthesia has been enthusiastically championed, to the point almost of discontinuing the arsenic application for devitalizing pulps. The writer has found the cocain method very satisfactory, but several cases of systemic effect, where less than one-twentieth of a grain of the cocain crystals was used, have served as a serious warning to him of the dangers that may arise. It seems evident that the blood vessels of the pulp carry the alkaloid into the general circulation even more directly than do the capillaries of the gum tissue. The writer has by no means discontinued the use of the slow but sure arsenical devitalizing fiber.—W. B. Dunning, *Dental Cosmos.*

Dentists for Panama Canal Men.—With the arrival of the Panama liner Allianca it was learned yesterday that the Isthmian Canal Commission would have two dentists to care for the teeth of its employes. O. N. Reubens, who arrived on the Allianca, said he and another dentist had been appointed and would have quarters at Gorgona and Culebra. Two dentists who practiced in the canal zone were not under the jurisdiction of the commission and were able to charge whatever they chose. The new men will have to regulate their charges according to a scale fixed by the Isthmian Canal Commission. Mr. Reubens will purchase dental supplies in this city and return to the Isthmus within a few weeks.—New York *Tribune.*

Use of Tinfoil.—The one thing above all others which I want to put stress upon is the application of tinfoil. By applying the tinfoil upon the model after it has been properly scraped, my claim is that the plate will fit very much better than if it were made on the plaster model, from the fact that it is made on a smooth, glassy surface, and consequently the suction is much stronger. Another claim which I make is that the plate, being made between tin dies, as it were, is very much more dense, consequently more healthful for the mouth, inasmuch as it will not absorb the secretions of the mouth to nearly so great an extent as when made

on plaster. And because the plate has a glossy-like surface next to the roof of the mouth, it will not irritate the mucous membrane and cause what is known as rubber sore mouth, as it will often do when made of plaster. In many, many cases of what has been known as rubber sore mouth, where the mouth has been almost like a piece of raw beefsteak, I have cured them with a plate made in this way.—S. C. G. WATKINS, *Items of Interest.*

NEURALGIA.—The fifth or trifacial nerve that divides into three branches, supplies both the teeth, as well as the eyes, for after its division the one branch supplies the inferior, one the superior maxilla, while the third, the ophthalmic branch, constitutes the sensory nerve of the visual organ. We may then very easily understand how pain in the eyeball may be caused by some irritation in the teeth. Neuralgia of the eyeball, therefore, may be the result of some dental irritation. Neuralgia of the supra-orbital nerve may have its direct origin in some pathologic process of the dental structure. In fact, Gosselin has seen supraorbital neuralgia disappear after the removal of an offending tooth.—AARON BRAY, M.D., *Dental Brief.*

CONDITIONS NECESSARY FOR GOLD FILLING.—There are certain conditions which are necessary that will enable us to make a gold foil filling that will be permanent. To four of these conditions I wish to call your especial attention:

First—The patient must be of a reasonable age. We must take into consideration the state of development.

Second—The cavity must be so located that every part of it may be made accessible.

Third—The tooth must have a reasonably healthy pericemental membrane.

Fourth—The cavity walls must be supported by sufficient dentin, so that they will withstand the pressure that is necessary to properly condense cohesive gold.—C. E. WOODBURY, *Dental Review.*

INDIGESTION IN CHILDREN.—Still summarizes the signs of indigestion in children, which condition demands special attention, not only because it is frequently mistaken for other conditions, but because it is of such vast importance during the age of active construction. Especially to be noted are a peculiar, heavy smelling, foul breath, a shortness of breath amounting to air hunger, and dryness of hair with loss of gloss. Lichen urticatus is almost positive proof of disturbance of the digestive system. He particularly emphasizes that a child should not have to start for school ten minutes after beginning a meal, and that it should not be compelled to go to a meal straight from sleep without having time fully to rouse itself. The idiosyncrasies of children are as important as those of adults and demand as careful study. Some children are poisoned by eggs, in whatever form; others by oatmeal porridge. The dyspepsia of childhood is generally carbohydrate dyspepsia. Brown bread in some children causes mucus

in the stools, which will cease on discontinuance of the bread. Toast, if given, should be toasted through to brittleness, not given soft inside, in which state it is no better, if not worse, than bread, in those cases in which bread disagrees. Excessive use of bread and butter and excessive milk drinking must be guarded against. "By all means let a child have as much milk as it can easily digest, but be careful not to pass this limit." Potatoes for some children are very indigestible. If given they should be mashed thoroughly with a masher, not merely with a fork.—*Jour. Amer. Med. Assn.*

CARE OF BURS.—Keep your burs sharp and clean; never remove a bur from the hand-piece until it has been thoroughly cleaned by the use of a stiff brushwheel attached to the head of the cable shaft of the engine. Do not use burs haphazard from your general stock and have them all dull and unfit for use. A dentist should have a good assortment of burs on hand, and from them select one or two of each number and use them until they need sharpening; then lay them aside and select another set. When you have a few dozen worn burs, have them recut and sharpened; by so doing you will always have burs in good condition. The small burs that are unfit to recut will make good drills by grinding to a spade-shaped form.—GUSTAVUS NORTH, *Dental Summary.*

PINLESS CROWNS IN PLATE WORK.—Use of pinless crowns in place of ordinary plate teeth in dentures approaches very near to the ideal in several respects. Being made to replace the natural teeth as crowns, they are the best imitations of the lost teeth to be had. The rubber is packed in the pin openings and allowed to extend around the neck of the crown, which will give them ample support. The finished plate gives a beautiful result, with the teeth life-like in form and appearance, the inter-dental space being reproduced as is not possible with any other teeth at present manufactured. These teeth should be sold for less than a pin crown, and would do away with any controversy over possible ill results with base metal pin teeth.—A. S. WALTZ, *Dental Review.*

CIRCULAR TO SOLDIERS IN PHILIPPINES.—The following recommendations of the Dental Surgeon in reference to the care of teeth are published for the information of all concerned:

"Each man should be provided with tooth brush, tooth powder (Lyons' tooth powder, sold in Commissary, very good), and Listerine, one bottle.

"The teeth should be cleaned after each meal; especially is this necessary after the evening meal. If the teeth are neglected at night the particles of food from the last meal remain around the teeth for twelve hours, decaying and becoming putrid.

PROPER WAY TO BRUSH TEETH.

"Wet the brush in water, put plenty of tooth powder on the brush, then brush the teeth upward and downward, using a rotary motion, so that the bristles will get in between the teeth. After the teeth have been

cleaned, rinse the mouth with equal parts of Listerine and water. If Listerine is not obtainable, use water alone.

"*CLEAN TEETH DON'T DECAY.*"

"This circular will be read to the enlisted men of each organization at the first retreat formation after its receipt."

By order of CAPTAIN SEAY.

H. A. DRUM, *Captain and Adjutant, 23d Infantry, Adjutant.*—JOHN A. MCALISTER, JR., *Army Dental Surgeon.*

SOME PROBLEMS OF CHILDHOOD.—Dr. H. P. Routh, Hackett, referred to the many dangers and difficulties of childhood due to the ignorance of mothers, midwives and meddlesome neighbors; to the unwarrantable substitution of artificial for breast feeding, thereby increasing the infant mortality; to contagion in the public schools, and to nostrums. It is the duty of the physician, he said, to safeguard childhood in every way possible, and the laity should be taught the lurking danger in baby elixirs, baby bowel remedies, cough syrups, etc., so attractively displayed in the druggists' windows and shelves and advertised in the press both secular and religious as well as in certain medical journals.—*Jour. Amer. Med. Assn.*

MARRIAGES.—Robert Good, a dentist of Chicago, was married to Mrs. Loretta A. Campbell of Toronto, Can., November 14, 1908.—Dr. Houston, a dentist of Chicago, was married to Mrs. Daisy Churchill of Princeville, Ill., October, 1908.—Lee L. Organ, a dentist of Indianapolis, was married to Miss Lillian Schmidt, also of Indianapolis, October 22, 1908.—Dr. Hyde, a dentist of Canton, Ill., was married to Miss Edith Drake, also of Canton, October 21, 1908.—B. P. Reidel, a dentist of Solon, Ia., was married to Miss Leona Martin, also of Solon, in October, 1908.—F. S. Beckman, a dentist of Grundy Center, Ia., was married to Miss Tillie Freese, also of Grundy Center, October 15, 1908.—D. A. Collison, a dentist of Marshalltown, Ia., was married to Miss Edna A. Guilford, also of Marshalltown, October 15, 1908.—M. C. Roberts, a dentist of West Point, Ia., was married to Miss Edythe M. Zaiser of Des Moines, October 14, 1908.—Edwin O. Carter, a dentist of Iowa City, Ia., was married to Miss Anna Addison, also of Iowa City, November 5, 1908.—L. M. Goodrich, a dentist of Auburn, Me., was married to Miss Lera M. Bearce, also of Auburn, October 21, 1908.—Matthew M. Mahoney, a dentist of Springfield, Mass., was married to Miss Abbie A. Keough, also of Springfield, October 6, 1908.—Albert J. Vaugier, a dentist of Holyoke, Mass., was married to Miss Margaret J. Field, also of Holyoke, October 7, 1908.—George F. Evans, a dentist of Wakefield, Mass., was married to Miss Claire C. Weeks, also of Wakefield, October 15, 1908.—Walter E. Schwind, a dentist of Vandalia, Ill., was married to Miss Etta M. Powell of Fairfield, October 14, 1908.—E. E. Lathem, a dentist of Columbus, O., was married to Miss Mayme Lytle of Cincinnati, October 17, 1908.—H. L. Scott, a dentist of Hamilton, O., was married to Miss Ella Morey-Decker of Dayton, November 5, 1908.—W. W. Kimmel, a dentist of Hancock, Mich., was married to Miss Rosanna Menard of L'Anse, November 4, 1908.